GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

Gas Bill Read the Third Time.

READERS will have noted with satisfaction that on Monday evening the Gas Undertakings Bill passed through Committee in the House of Commons without further amendment, and was read the third time. When the Committee stage was reached, attention was drawn to the fact that sub-tenants using gas through subsidiary meters are frequently charged by the main tenant or landlord a higher price than he himself pays for the consumption registered by the master meter; and the Member who raised the point said he thought that something should be done to put an end to this. The matter was not, however, pressed, after the Parliamentary Secretary to the Board of Trade (Mr. H. G. Williams) had expressed the opinion that it could not be dealt with in the present Bill. Mr. Williams subsequently allayed the fears of another Member by assuring him that the principle of the sliding-scale has been preserved in the Bill.

Enterprise in Selling Coke.

DURING recent years gas engineers have done a great deal—though, perhaps, hardly sufficient—to ensure that the coke they manufacture shall give satisfaction in its different applications, domestic and industrial. Great improvements have undoubtedly been effected as the result of attention to the purchase of suitable coals and to their blending, and to the handling, quenching, and grading of the coke produced. In regard to sales methods, however, the state of affairs is not nearly so happy; and much adverse criticism could justly be directed to one particular phase of coke sales—that of delivery, which is at present treated far too casually. The customer may invariably be right; but it does not follow that he or she will be at home if coke is delivered on a day which either precedes or comes after that scheduled.

Bearing this in mind, we hail with great satisfaction the account of the efficient manner in which the Tottenham and District Gas Company are dealing with the problem. The system was explained by Mr. H. C. Smith, the Company's Chief Engineer, in his Presidential Address before the Eastern Counties Gas Managers' Association to-day. In brief, the consumers in the Tottenham area are invited to take advantage of a domestic contract scheme whereby they receive their coke at a price well below that ruling on the day of delivery, their only obligation being that they agree to the whole of their requirements for gas coke for twelve months being satisfied by the Company. Following the signature of a form of agreement, those participating in the scheme are supplied with postcards designed to make the ordering of coke as simple as possible. That there has been appreciation of the Tottenham Company's enterprise is demonstrated by the fact that, since the inauguration of the scheme in 1927, over 2600 contracts have been made—a number which is being added to at the average rate of fifty per month. We suggest that the reason for this appreciation lies not only in the direct financial saving and in the facilities given for ordering, but also—and in large measure—in the certainty of delivery of the coke. The whole of the Tottenham district is mapped out into areas for coke delivery. Regular days are allotted for deliveries in each district, and they always take place on the same day of the week. "This method," stated Mr. Smith, "has been found to have several advantages, and many consumers now give standing orders for definite quantities to be delivered periodically." There seems every reason to believe in the eventual fulfilment of Mr. Smith's hopes that the whole of the surplus coke produced at Tottenham will be consumed for domestic use within the Company's district.

"Coke sales," however, is only one of the numerous facets of the gas engineer's work discussed by Mr. Smith in his Address, which throughout indicates the spirit of action and progress which moulds the policy of his Company. The steps taken at Tottenham to make certain that, as far as possible, every consumer is at all times supplied with gas of constant quality and at uniform pressure were detailed by Mr. Smith in his paper at the annual meeting of the Institution of Gas Engineers last June; and there will be general agreement with his present contention that, unless this condition is satisfied, maintenance schemes start on a faulty basis. Considerations of finance ruled out "free" maintenance at Tottenham, and the Company have adopted a direct-payment contract scheme on original lines. The maintenance of new appliances purchased direct or on hire-purchase—incidentally Mr. Smith does not sing the praises of simple hire—is covered by the addition of a sum to the selling price or the hire-purchase instalments. Existing apparatus is maintained at the consumer's request; and the consumer pays for the work he wishes to be performed. Maintenance of a cooker, for example, costs him 6s. a year, and of a fire 3s., and, if he wishes, he can contract for the maintenance of all his appliances by paying an "all-in" domestic charge of 10s. per annum. As yet, comparatively few consumers have availed themselves of this service. Inspection (as distinct from maintenance) of all prepayment installations has been undertaken at Tottenham, and has shown that a very large percentage of the total fittings were wholly unsatisfactory—a fact which points to the advisability of some form of universal inspection or maintenance, though doubtless the percentage would be lower in regard to the fittings of ordinary consumers.

The demand for gas has grown enormously in the Tottenham area during recent years; and Mr. Smith's account of how this demand has been met at congested works by Woodall-Duckham vertical retorts having a great thermal output of gas in relation to the ground space occupied, and by the employment of silica horizontals, is evidence of the progress which has been quietly, but continuously, effected in gas-making plant.

In regard to this demand, Mr. Smith rightly assesses the value of the lighting load. The average consumption per prepayment meter over the whole of the Tottenham Company's district is 24,000 c.ft. per annum; and of this amount, lighting accounts for 9000 c.ft., or 37 p.ct. Moreover, this load does not depend to any extent on climatic conditions—which, in view of the alarming increases in daily outputs last February, will be readily appreciated. Admittedly the gas industry is largely hampered by popular opinion and prejudice in the field of domestic lighting. The public lighting load, fortunately, does not as yet suffer to the same degree; and Mr. Smith's figures relating to the steady increase in street lighting by gas in his area show what can be done if proper attention is paid to the matter. Good gas, modern lamps, and efficient service—to this trinity is due the fact that nearly 92 p.ct. of the street lamps in the Tottenham area are illuminated economically by gas. Given fair competition, gas for street lighting cannot be beaten either for economy or efficiency; and Mr. Smith indicates that the same statement is true in regard to factory lighting. His address, which, published in our columns to-day, will be read with keen interest, is full of interesting suggestions and new thought, and it provides ample proof that enterprising methods bring a splendid reward.

Low-Temperature Carbonization.

GREAT future though there may well be for the low-temperature carbonization process, that it does not, and cannot, offer any short cut to a solution of the difficulties which have beset the coal trade in the past, is the opinion of the Marquess of Hartington, M.P. His reasons for arriving at this conclusion are set out in the Presidential Address delivered by him at yesterday's meeting of the Society of British Gas Industries, as reproduced in this issue of the "JOURNAL."

In considering low-temperature carbonization problems, the truth that the technical side and the financial side are governed by a totally different set of factors, has not in the past invariably received adequate recognition; and there has at times been a tendency to overlook the fact that, in connection with any commercial process, the balance-sheet is the test by which it must eventually stand or fall.

No such mistake as this is made by the Marquess of Hartington, who gets down in his address to the very root of the subject. On the one hand, he shows us the coal industry endeavouring to find a remunerative outlet for the cheap slacks produced in all mines to a greater or less degree; and, on the other hand, there is the domestic consumer who, if coal is to be displaced by an improved solid smokeless fuel, must have this fuel supplied to him at a price little, if any, more than the ordinary coal. How is this likely to work out? The President tells us. In the first place, the suggested smokeless fuel must be low both in ash and in moisture; and therefore the cheap slacks, being mostly high in ash, must be well cleaned. Secondly—and this appears to be by far the more important consideration—"immediately the demand for these cheap coals is increased, whether for the purpose of low-temperature carbonization or for the production of hard coke in coke ovens, the prices of such material will inevitably rise." With this increase in the cost of washed slacks, the attraction to the domestic consumer of the resultant smokeless fuel will be diminished, and, to quote the words of the address, "it will be all the more difficult to make any process of low-temperature carbonization a commercial success, except in special circumstances."

The process of cleaning, which the Marquess of Hartington shows to be necessary in the case of most of the cheap slacks that might be employed for low-temperature carbonization, he also recommends should be applied universally to coals used for ordinary gas making purposes, the resultant coke from which would be far more attractive to the domestic user than much of that which he receives to-day. This improvement of coke produced in high-temperature carbonization might fairly be expected, in its turn, to be reflected in the low-temperature carbonization balance-sheet.

In Furtherance of British Industry.

MUCH is expected of the Government Committee on Education for Salesmanship, who have had allotted to them a task which is of vital import to British industry. The comfortable old doctrine that good things will sell themselves has lost most of such foundation on fact as it at one time possessed. Nowadays selling is a far more complicated matter than this—so complicated that it is difficult to lay bare everything that influences it. Results are visible for the eye to see, and for the mind to comprehend. The causes which lead up to these results, on the other hand, lie hidden, often so deep as to defy for a long time the efforts of the most indefatigable investigators. One witnesses every day, for instance, results which medical science is unable to combat because of its inability to trace causes.

It is fairly generally realized to-day that this country is not deriving in the markets of the world the full advantages to which the excellence of its products entitles it. This is a result which is present for those with eyes to see, and for those with minds to comprehend. For the application of an effectual remedy, it is essential that the causes should be discovered. Having found out exactly where the weaknesses lie, it will be for the Committee on Education for Salesmanship to formulate the remedies. Mr. Francis W. Goodenough, C.B.E., who is Chairman of the Committee, was able to announce last week, at the annual dinner of the Incorporated Sales Managers' Association (of which also he is Chairman), that the work is making good progress, and that as soon as further replies to certain inquiries have been received it is the intention of the Committee to issue an interim report, which will be followed by other brief ones, designed to facilitate action. That is excellent news, for the problem is a pressing one. We all want to see this country's salesmanship as good as its products; and we are all anxious to know how to make it so.

The Committee will lay down the lines along which education and training for salesmanship should proceed; but nothing of this kind can avail unless it be applied to the right material, and in this connection industrialists must bear in mind the necessity of making salesmanship sufficiently attractive to appeal to the class of man who is qualified to be successful in it. In other words, manufacturers should realize the need of adequately paid salesmen. A good salesman must have both heart and soul in his work; and he could not if the remuneration were not sufficient to keep body and soul together. We are glad that Mr. Goodenough emphasized the importance of adequate remuneration, and hope that this point will not be lost sight of when the reports of the Committee come up for consideration.

Good Gas plus Good Coke.

ONE of the chief characteristics of Scottish coals is their comparatively low coking power. This renders them particularly suitable, in regard to both large throughputs and high gaseous thermal yields, for carbonization in continuous vertical retorts. On the other hand, treatment of these coals has the disadvantage that the small material tends to remain in the form of breeze after carbonization, and this naturally has an adverse influence on the revenue from coke, and hence on the cost of the therm into the holder. To secure the advantages and eliminate the disadvantage was the aim of the Glasgow Corporation Gas Department; and their aim has been achieved in the recently constructed Dawsholm Works. Exactly how this has been accomplished is told in a paper by Dr. E. W. Smith and Mr. T. Campbell Finlayson—whose names are familiar to all our readers—before the Scottish Junior Gas Association (Western District) on the occasion of their visit to the Dawsholm Works last Saturday. This paper is published in our issue to-day; and everyone who reads it must agree with the authors' contention that the combination plant is unique, and that Dawsholm has been the scene of important developments in carbonizing practice.

The Glasgow Gas Department have had full experience of carbonization in continuous verticals. At their Provan

Works there is a single plant of Woodall-Duckham design with a carbonizing capacity of 1356 tons of coal per day. To date, this plant has treated over 2,300,000 tons of coal without so much as one producer lining being repaired, and without any retort reconstruction; and in view of the success of this installation, it is in no way surprising that the Department should have had the confidence to entrust to the Woodall-Duckham Company the contract for the erection of new plant at Dawsholm capable of producing 9 million c.ft. of gas a day, and capable also of manufacturing a coke of such quality as to ensure a ready and profitable market. In brief, this amazingly flexible installation consists of two benches of continuous vertical retorts, and two benches of intermittent vertical chambers, together with coal washing, blending, and handling plants; and it enables the Department to purchase cheap coal from various sources, in the knowledge that its treatment will result in high thermal yields of gas and excellent coke. As the authors observe, a high yield of gaseous therms does not necessarily mean cheap gas; but when a high thermal yield is obtained with a much improved coke, the price prospects are distinctly favourable.

The scheme of working is epitomized clearly in the "flow sheet of coal" given in the paper, from which it will be seen that most careful attention is paid to the preparation of the coal before it is charged into either continuous verticals or intermittent chambers. Screened coal above ¾ in. is dealt with in the former plant working under steaming conditions. The small coal below ¾ in. passes to a screen of ⅛ in. mesh; and that of a size between ⅛ in. and ¾ in. is washed, dried, and mixed with the coal below ⅛ in. The whole is then blended with coking slacks, is disintegrated, and is fed to the intermittent chambers; the coke produced in the latter being dry-quenched in a Sulzer cooling plant. Thus the combined plant has an exceptionally wide range of flexibility as regards gas output, choice of coal, quality of coke, and calorific value of gas; and we call attention to the extent to which scientific control instruments have been employed to ensure steady and economical working.

As a final note we cannot do better than re-echo the concluding observation of Dr. Smith and Mr. Finlayson: "It is too early to speak of results from the plant, but "these will be eagerly awaited, and will undoubtedly "make interesting reading when the Glasgow Corporation Gas Department find it possible, at some future "date, to publish them."

General Notification of the Gas Referees.

A re-issue of the General Notification of the Gas Referees has been made, to take effect as from to-day; and a review of this appears on p. 275. One of the innovations is that a one-tenth cubic foot per revolution meter may now be used in place of a one-twelfth unconditionally, whereas previously special approval was needed for it. Another point is that the permissible distribution of testings over the quarter is set out more precisely. The greatest novelty, however, is in connection with recording calorimeters. It seems that, before long, all the larger gas undertakings (annual production over 100 millions) may be required to instal them. For those concerns whose yearly output is over 250 million c.ft., the Boys, the Fairweather, or the Thomas recording calorimeter made by the Cambridge Scientific Instrument Company will be prescribed; and for undertakings whose output lies between 100 and 250 millions, the "Sigma" inferential recording calorimeter, used in conjunction with a Boys non-recording calorimeter, will be included as an alternative to the foregoing types. It is prescribed, however, that the record of the "Sigma" instrument shall not be used for ascertaining the calorific value for any period of less than seven days. The new issue of the General Notification is obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2; price 1s. 6d. net (by post 1s. 10d.).

Goodwill as an Aid to Business.

In view of the unsettled state of affairs which has recently prevailed in the area served by them, the Bombay Gas Company's announcement that the dividend for the past year would be only 1 p.ct. less than that paid for the previous eleven years is regarded by the shareholders as extremely satisfactory; and the Board were warmly complimented by proprietors present at the annual meeting last week. The results of the year's working are certainly gratifying, when considered in the light of the Chairman's statement that "many of the inhabitants have been driven away to places where living is cheaper and less hazardous, and nearly all who are left are forced to curtail their expenditure, even on such a necessary and economical commodity as gas." To some extent surely the comparatively satisfactory position of affairs may be ascribed to the goodwill which the broad-minded policy of the Company has built up. As they have sown, so are the Company reaping. That this goodwill does exist was made clear by the report of Mr. George Evetts, who visited Bombay some months ago, in order to inspect thoroughly the works and business of the Company. In the course of his report, Mr. Evetts stated that the Company were fortunate in being in very good favour with the consumers, as well as with the local authorities and other public utility undertakings. He had had the opportunity of discussing the business and policy of the Company with Government and Municipal officials, electricity and tramway companies' men, as well as most of the largest consumers; and there was no doubt about the good feeling which existed.

Public Gas Lighting.

Out of 8000 public lamps in Bombay, 7000 are lighted by gas. These are significant figures, as showing how widespread is the popularity of gas for street illumination purposes. Reliability is a great point in favour of gas for public lighting; and its value is evidently appreciated to the full in Bombay. Even during the state of disorder which has been experienced there, though the utmost difficulty was experienced in maintaining the lighting and extinguishing of the public lamps (as the lamplighters refused to go into the disturbed areas without being escorted by the Company's Public Lighting Superintendent and his assistants), with very few exceptions the lamps were kept in service.

Excellent Examples.

That gas has not undeservedly gained its popularity for street lighting purposes is generally admitted. We have referred in the paragraph above to its reliability; but this, though of first-rate importance, is only one of its advantages. Two other great points in its favour are suitability and economy. For purposes of example or of argument, each one of us could cite cases of street lighting by gas which leave nothing whatever to be desired; but pictorial demonstration is not always at hand. For this reason, we wish to compliment the British Commercial Gas Association upon the latest issue of "A Thousand-and-One Uses for Gas," which deals with street lighting. The examples illustrated are taken from Greater London, where, it is pointed out, there are already nearly 100,000 gas street lamps in use. They refer to important thoroughfares, beginning with Whitehall, which has been illuminated by the present system of high-pressure gas lighting for nearly twenty years, throughout the whole of which time there has never been a failure in the general supply of gas to these lamps. Each photograph is accompanied by a concise description of the installation shown; and the series make up a powerful argument in favour of gas for public lighting. This is an issue of "A Thousand-and-One Uses for Gas" which should be carefully filed by gas engineers for future reference.

Gas Aids the Telephone.

In the issue of "A Thousand-and-One Uses for Gas" to which allusion has already been made, there is a statement which shows how well adapted gas is to keep pace with the most modern developments. Public telephone kiosks are now being installed extensively in the streets, and are available for use throughout the twenty-four hours of the day. Special attention has therefore been given to their interior lighting. There are no attendants at these kiosks, and means have to be provided for the automatic lighting-up and extinguishing of the illuminant. A telephone box of metal construction is illus-

trated which is illuminated at night by gas. The lighting unit is a specially-designed incandescent burner of medium size. This is fixed in the dome of the structure, with its mantle in the centre of a circular opening in the roof. A silica-ware globe, protected by wire guard, diffuses and softens the light. A clockwork controller automatically turns the light on and off at the usual times fixed for street lamps. In the outlying districts of London, concrete telephone boxes are being erected; and for those which are lighted by gas, a lighting unit of slightly different pattern from the one described has been designed.

Battersea Power Station.

In the "JOURNAL" for April 17, attention was drawn to the storm of protest which has greeted the proposal of the London Power Company to erect at Battersea (actually 300 yards from Westminster) an electricity generating station destined to consume 800,000 tons of coal per annum, and possessed of six chimneys 255 ft. in height—not a very picturesque feature of the landscape, nor one which will add to the amenities of London. On April 25 the Westminster City Council decided to ask the Electricity Commissioners to re-open the whole question, with a view to the selection of a site outside the Metropolis. Councillor Howard, the Chairman of the Law and Parliamentary Committee, said that a large sum would be spent on the station, and the moment a south-west wind arose the Council's Medical Officer of Health would report on the damage to property and injury to health which was being caused by the fumes. The Council would then go to the Court to obtain an injunction to stop the nuisance; and if the precedent of the Manchester Corporation (see "JOURNAL" for Dec. 19, 1928, p. 782) held good, as presumably it would, then the Council would be successful. In the House of Lords on the same day, Lord Jessel expressed the hope that the Government would make a move in the matter, to prevent the erection of the station. If they did not do so, he observed, there was no doubt that the public bodies who were opposed to the project would apply for an injunction. The Earl of Birkenhead mentioned that the London Power Company had already entered into contracts worth £1,500,000, and suggested that Lord Jessel's view was unduly pessimistic. The Marquess of Londonderry pointed out that, if the station was placed a long way out of London, then the public would have to shoulder the burden of distribution costs, which were heavy. His optimism concerning the future of electricity carried him so far as to say that, by electricity being made available to the population in London, the consumption of coal in a great number of houses would be reduced. Neither Lord Londonderry nor Lord Birkenhead appears to have realized the strength of the feelings by which the protesters are actuated; and neither of them ventured to say that chemical research has yet reached the point when the emission of sulphurous fumes from the chimneys of power stations can be prevented.

Minimizing Gas Leakage Dangers.

Our readers will be interested in a new invention designed to ventilate the sub-soil of roads and footpaths, and thereby minimize the possibility of dangerous explosive mixtures accumulating under road surfaces. The device is known as the Donkin "Sub-Soil" vent box, and it is protected by a provisional patent. From the illustrations in our pages to-day, it will be seen that the invention is a simple one—in brief, comprising a metal vent pipe from which any escaping gas passes into a cast-iron surface box, and thence into the atmosphere. Modern road surfaces are practically gas-tight, and there is always the possibility of gas pockets accumulating under these surfaces in most large towns, where thoroughfares have been widened during the last thirty years or so. In many cases old underground cellars of demolished property have been filled in with loose bricks, and these form localized accumulators of large quantities of gas which may escape below the road surface. There is also the danger of escaped gas entering the cellars of dwellings. The appliance incidentally serves to indicate the position of gas mains.

PERSONAL.

Mr. CHARLES W. BRAINE has retired from the Secretaryship of the Wandsworth, Wimbledon, and Epsom District Gas Company; and in the "Wandgas Magazine" he writes a farewell message. Mr. Braine, who entered the gas industry in 1881, was appointed Secretary of the Wandsworth and Putney Gas Company in 1895; and during his thirty-three years' service in that capacity he had as Engineer-colleagues Mr. H. S. Freeman, Mr. Herbert Jones, Mr. H. O. Carr, and Mr. C. M. Croft, the present Chief Engineer and General Manager. When Mr. Braine first joined the Company, the quantity of gas sold was less than 500 million c.ft. per annum, the consumers numbered 6602, and the capital laid out was £148,167. To-day the corresponding figures are 3663 million c.ft., 91,378, and £1,562,327. A desk is to be presented to Mr. Braine as a parting gift from the Company's employees.

Mr. HAROLD PICKLES, Assoc.M.Inst.C.E., F.C.S., the Assistant Engineer to the Darlington Corporation Gas Department, has been appointed Secretary and Manager to the Morley Corporation Gas Department, in place of Mr. Herbert James Hemingway, whose death is announced in our columns to-day.

Mr. BERNARD STONHAM, an Assistant at the Tunbridge Wells Gas-Works, has been appointed Engineering Assistant to Mr. R. Nelson, Engineer and General Manager of the East Hull Gas Company. Mr. Stonham was educated at Skinners' School, Tunbridge Wells, and afterwards became articled to Mr. L. J. Langford, Engineer to the Tunbridge Wells Gas Company.

Mr. T. W. BENNETT, Assistant Manager of the Gravesend and Milton Gas Light Company, has been appointed Assistant Manager of the Guernsey Gas Light Company, Ltd.

We learn that Mr. G. M. GILL has recently returned from a trip to South America, where he has been examining and reporting upon the gas undertakings at Rio de Janeiro, San Paulo, and Santos, for the Canadian and General Finance Company of Toronto and London.

Mr. R. H. RUTHVEN, the Engineer and Manager of the Ramsgate Gas Department, has been elected President of the Ramsgate Rotary Club; and Mr. J. M. CAMPBELL, the Engineer and General Manager of the Isle of Thanet Gas Light and Coke Company, has been elected to the same office in connection with the Rotary Club of Margate.

Dr. W. T. K. BRAUNHOLTZ, who has, for the past two years, been in charge of the Northern Coke Research Committee's experimental work at Armstrong College, Newcastle, is shortly taking up the appointment of Chief Chemist for the Collieries and Coke Ovens of Messrs. Pease & Partners.

Mr. GEORGE MOTT, Chairman of the Ilkley Gas Committee for the past four years, is the newly-elected Chairman of the Ilkley Urban District Council.

Councillor ARTHUR FRANK PULLEN has been appointed Chairman of the Wallasey Gas and Water Department in succession to Alderman McMillan, M.B., who has retired from the Council. Mr. Pullen has been a member of the Gas and Water Committee since 1921, and has on occasions occupied the office of Vice-Chairman.

Mr. and Mrs. JOHN HENRY WEATHERBY, of Alsager, have recently celebrated their ruby wedding. Mr. Weatherby is a Director of the Kidsgrove Gas Company.

Mr. W. LINDSAY BURNS has been appointed General Manager of the firm of Messrs. Henry Balfour & Co., Ltd., Durie Foundry, Leven. Mr. Burns received his early engineering training with the firm of Messrs. Gourlay Bros. & Co., Engineers, Dundee, and later he secured an appointment with Messrs. Babcock & Wilcox as draughtsman in their London Office, where he was engaged on the design and lay-out of coal handling plant, &c. Later he served as Engineering Assistant to Mr. Alexander Yuill, former Gas Manager and Engineer of Dundee, where he took part in the reconstruction of the works, installing a purifying plant of 4½ million c.ft. capacity per day, complete with structure, elevators, &c. At the same time he remodelled the sulphate of ammonia plant and installed cyclone tar extractors. Early in the war, Mr. Burns was entrusted with the design and erection of a complete wood distillation plant, which included mechanical and block retorts, and condensing, washing, scrubbing, pumping, and storage plant. This unit was for the manufacture of calcium acetate for war purposes. For several years he has been in the employment of the Caledon Shipbuilding and Engineering Company, Ltd., first as draughtsman in their engine works, and later as Company Engineer, where he was responsible for the whole of the plant. Later he was promoted to the position of Manager in their tank and structural department. He was responsible for the building-up of this department, and during the course of the last few years has carried out numerous large contracts, including tar distillation plant, riveted and welded tanks of all descriptions, chemical plant, &c. Mr. Burns takes up his duties with Messrs. Henry Balfour & Co. to-day.

OBITUARY.

We regret to have to announce the death of Mr. HERBERT JAMES HEMINGWAY, the Secretary and Manager of the Morley Corporation Gas Department. Mr. Hemingway was Secretary of the Morley Gas Company when the works were transferred to the Corporation in January, 1899, and was subsequently appointed Manager. During his term of office, the works were remodelled; vertical retorts and a Tully gas plant being installed. Mr. Hemingway died unexpectedly after a very short illness. He enjoyed the confidence of the Corporation; and at the last meeting of the Council high tribute was paid to his integrity and abilities.

LUNCHEON TO SIR ARTHUR DUCKHAM, K.C.B.

Sir Arthur Duckham has now returned to this country from Australia, where he has been acting as leader of a Commission for the purpose of conferring with the Commonwealth Government on the development of Australian resources and the promotion of trade between Australia and the Mother Country. It has been decided by the Governing Bodies of the following Associations:

British Commercial Gas Association,
Federation of Gas Employers,
Gas Companies' Protection Association,
Institution of Gas Engineers,
National Gas Council, and
Society of British Gas Industries,

that this opportunity should be taken of congratulating Sir Arthur Duckham on the success which has attended the work of the Commission; and Sir Arthur has accepted an invitation to luncheon at the Savoy Hotel, Strand, W.C. (Embankment Entrance), on Wednesday, May 15, at 1 o'clock.

NATIONAL GAS COUNCIL.

South-Western District Executive Board Meeting.

The Annual Meeting was held at the Offices of the Exeter Gas Light and Coke Company on Wednesday, April 17, at 2.15 p.m.—Mr. P. S. HOYTE (Plymouth) presiding.

A letter was read from Mr. R. Bruford regretting his inability to preside, owing to urgent County Council business.

The minutes of the last annual meeting and of the last special meeting of the District Executive Board were read and confirmed.

Messrs. S. S. Ogilvie and E. J. Fottrell, Joint Managers of the National Gas Council, attended; the former addressing the meeting.

A resolution was unanimously carried in favour of steps being taken for co-operation in the marketing of tar and its products.

The annual report was adopted, and the list of elected members received.

The following officers were appointed for the ensuing year:

Chairman.—Mr. R. Bruford, J.P., C.A. (Taunton).

Vice-Chairman.—Mr. P. S. Hoyte (Plymouth).

Hon. Secretary.—Mr. E. P. Vince (Minehead).

Management Committee.—Messrs. J. Armstrong (Ilfracombe), F. Blackburn (Devonport), J. B. Cattle (Dartmouth), J. H. Cornish (Bridgwater), C. G. Dawson (Torquay and Paignton), W. E. Dean (Exmouth), S. E. Halliwell (Bristol), S. J. Ingram (Truro), J. E. Norman (Weston-super-Mare), W. N. Westlake (Exeter), J. Wesley Whimster (Bath), and T. H. Woodcock (Stroud).

Mr. S. J. Ingram, retiring by rotation, was re-elected as one of the four representatives on the Central Executive Board.

IMPORTANCE OF GOOD SALESMANSHIP.

Mr. F. W. Goodenough on the Work of the Government Committee.

The Annual Banquet of the Incorporated Sales Managers' Association, which took place at Grosvenor House, Park Lane, London, W., on Monday of last week, was a brilliant function, at which the chief guest was Sir Philip Cunliffe-Lister, K.B.E., M.C., M.P., the President of the Board of Trade. The chair was occupied by the President of the Association, Viscount Leverhulme, D.L., J.P.; and he was supported by Mr. Francis W. Goodenough, C.B.E., who is Chairman of the Government Committee on Education for Salesmanship, and Chairman also of the Incorporated Sales Managers' Association. Nearly all the members of that Committee (in whose work the Association take so close and hopeful an interest) were present.

BRITISH TRADE DEPENDENT ON EFFICIENT SALESMANSHIP.

Mr. GOODENOUGH, submitting the toast of "British Trade," said that to-day, as never before, the prosperity—indeed, the future existence—of British trade depends upon efficient salesmanship. The position of British trade in the markets of the world to-day is considerably worse than it might or should be because our methods of marketing in too many cases are not appropriate to the conditions, or equal to the needs, of the times in which we live and trade. There is, of course, much first-class salesmanship displayed by British houses to-day. British brains, like British goods, are equal to the best in the world; and where the brains have been applied thoroughly and persistently to the problem of marketing, the methods adopted have been efficient and successful to a high degree. But we want to stop the relative falling-off of the imports of British goods into many countries which the trade statistics all too clearly reveal, and substantially to increase the volume of our trade with them; and this can be done only if we will everywhere thoroughly and speedily overhaul, modernize, and vitalize our methods of marketing—our salesmanship.

PROGRESS OF THE COMMITTEE'S INQUIRY.

Proceeding to refer to the work of the Committee on Education for Salesmanship, Mr. Goodenough said that leading business firms in six great industrial and commercial centres are being interviewed by representatives of the Board of Education who have special knowledge of the facilities for commercial and technical education in this country, to ascertain the views of the business world on the problem which the Committee were appointed to solve. That work is making good progress. Much interest is being displayed by those interviewed; and the reports already received show that the Committee will derive great assistance from this line of inquiry. In determining the firms to be approached in the way indicated, the assistance was invoked of the Federation of British Industries, of the Chambers of Commerce in the areas concerned, and of other representative institutions. These and other organizations have also been invited to submit their views on the problem. Valuable memoranda have already been received.

Further, soon after the Committee were established, letters were addressed to the officers of the Department of Overseas Trade in our principal Colonies and Dominions and in the principal foreign countries, and to all the British Chambers of Commerce abroad, with a view to ascertaining in what directions (if any) our methods of marketing call for revision—that being an essential prelude to the Committee complying with their instructions to advise as to how, by means of education, those methods might be improved. The replies already received to these inquiries provide most important evidence. So soon as they are all to hand and have been digested and considered, the Committee propose to issue an interim report. They hope to issue a number of brief reports that may facilitate action, rather than one compendious volume to repose, moribund, on over-loaded bookshelves. It soon became evident that a very general complaint regarding methods of marketing was as to our failure to use the language of customers, alike in correspondence and in converse with them; and the Committee accordingly arranged with the Board of Education for an inquiry to be set on foot into the teaching of modern languages here and in several other countries from whom there is most promise of learning useful lessons. It is hoped to complete that inquiry by the end of this year.

Unless manufacturers awaken to the need for a larger number of more thoroughly qualified (and more adequately paid) salesmen, it would be worse than useless to plan for their education and training. It is every whit as necessary to create the demand for efficient salesmen as to provide the supply. That is why the Committee are anxious that the whole question should be kept constantly before the world of commerce and industry.

SALESMANSHIP AND SERVICE.

Sir PHILIP CUNLIFFE-LISTER, in reply, remarked that sales managers can contribute a great deal to the prosperity of British trade. There is throughout the world to-day great goodwill towards British industry and British products. Personal contact between the manufacturer and his market is vital; and the selection of the right representative in distant lands is of great moment. Salesmanship is really service which only begins when the article is sold—it does not end until repeat orders have been secured. We have in this country the best raw material for the making of salesmen that any country possesses; and they only need to be trained in the right way. We have great assets. We have good relations in industry; and our customers know that when delivery is promised it will be made. We have also our great reputation for integrity, and

the tremendous prestige which Britain still has throughout the world. With these advantages, we can have every confidence in the future prosperity of British trade.

Sir Arthur Duckham, K.C.B., proposing "The Association," expressed the opinion that salesmanship is a thing which comes naturally to some people. Salesmanship consists in studying the requirements of your customer. Much more can be done in the Dominion markets that are ready to our hand. The difficulty is to impress people with the opportunities which these markets present.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

The stock markets remained in a subdued condition during the whole of the past week. Home politics and uncertainty regarding reparations were again the chief adverse factors; but while Foreign stocks showed a marked weakness, the Home gilt-edged securities, with 5 p.ct. War Loan leading the way, maintained a firm tone throughout.

The only sign of activity was in the Industrial Market; and a number of old favourites came in for a fair amount of support. No market, however, was so popular as the Gas Market, in which quite a number of stocks moved upward. Imperial Continental Capital Stock again topped the list, and there was another sensational advance of 45 points. The further increase was attributed to the successful progress of the Company's new Bill in Parliament. Other ordinary stocks moved up, possibly in sympathy. Among these were Continental Union 7 points to 126-131; Sheffield Cons. 3 points to 109-111; and Bristol 5 p.ct. 2 points to 91-92. Preference stocks were also prominent; and 2 points increase were recorded in Continental Union 7 p.ct. pref., Liverpool 7 p.ct. red. pref., and Tottenham 5½ p.ct. pref. The demand for gas stocks continues to exceed the supply. This is not surprising, having regard to the satisfactory reports of the sales of gas during the quarter ended March.

The following transactions were recorded during the week:

Monday.—Bournemouth "B" 12½, British 118, 5 p.ct. deb. 95½, Continental Union 122, 123, 123½, 124, 124½, European 18, £18 1s., £18 3s. 6d., 18¾, 18¾, 19, Gas Light and Coke 19s. 1½d., 19s. 4½d., 4 p.ct. pref. 76¾, Imperial Continental 403, 405, 406, 407, 408, 410, 411, 412, 415, 417, 420, 422, 425, 426, 427, 429, 430, 431½, 432, 433, 434, 435, 436, 437, 437½, 438, 439, 440, 440½, 441, 442, 444, 445, Primitiva 34s. 1½d., 34s. 3d., 34s. 6d., 34s. 6¾d., 34s. 7½d., 34s. 9d., South Metropolitan 104½, 104⅝, 104¾, 105¼, 105½, South Suburban 5 p.ct. deb. 97½, Swansea 7 p.ct. pref. 101¾. Supplementary prices, Cheltenham 5 p.ct. max. 70, Croydon 5 p.ct. deb. 97½, 7 p.ct. deb. 97, Kingston-upon-Thames 105.

Tuesday.—Bournemouth 6 p.ct. pref. 11, Brighton and Hove 6 p.ct. 115, 115½, 5 p.ct. 101, British 5 p.ct. deb. 95½, Continental Union 125, 125¼, 125½, 126, 126½, 127, 128, European 18½, 18¾, 19, 19⅛, 19¼, Gas Light and Coke 19s. 1½d., 19s. 3¾d., 19s. 4¼d., 3½ p.ct. 63¾, 64½, 4 p.ct. pref. 76½, 3 p.ct. deb. 60½, Imperial Continental 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 455, 460, Montevideo 107½, Portsmouth 5 p.ct. max. 84, Primitiva 34s. 3d., 34s. 4½d., 34s. 6d., 34s. 9d., 35s., 35s. 1½d., South Metropolitan 104¾. Supplementary prices, Tottenham 5 p.ct. red. mort. 98, Ventnor 10 p.ct. 20.

Wednesday.—Bournemouth 7 p.ct. 12¾, British 117¾, Continental Union 124, 124½, 125½, 126½, 127, European 18¾, £18 16s., 19, 19¼, Gas Light and Coke 19s. 1¼d., 19s. 3⅜d., 19s. 4½d., 3½ p.ct. 63¾, 64½, Imperial Continental 434, 435, 437, 438, 440, 442, 443, 445, 447, 450, Newcastle 3½ p.ct. 17s. 9d., Primitiva 34s. 3d., 34s. 4½d., 34s. 6d., 34s. 7½d., 34s. 9d., 35s., South Metropolitan 104½, 105½, Swansea 7 p.ct. pref. 102. Supplementary prices, Danish 7¾, Grays and Tilbury "B" 11⅝.

Thursday.—Aldershot 4 p.ct. pref. 76, Brighton and Hove 5 p.ct. 100½, British 117¾, 118½, 5 p.ct. deb. 95½, Continental Union 125, 125½, 126, 127½, 128, European 18¾, Gas Light and Coke 19s. 1¼d., 19s. 2¾d., 3 p.ct. deb. 60, Hastings and St. Leonards 3½ p.ct. 85, Imperial Continental 433, 435, 436, 437, 438, 440, 441, 442, 442½, 443, 445, Primitiva 33s. 9d., 33s. 10½d., 34s., 34s. 3d., 34s. 4½d., South Metropolitan 105¼, 6 p.ct. pref. 109, Swansea 6½ p.ct. deb. 101½. Supplementary prices, Croydon 5 p.ct. deb. (interest from April 30, 1929) 97, Danish 8, Grays and Tilbury 4 p.ct. deb. 75, Liverpool 5 p.ct. 94¼, Tottenham 5 p.ct. pref. 91, 91½, Wolverhampton 10 p.ct. 154, 3½ p.ct. deb. 61, Yorktown (Camberley) and District new 5 p.ct. pref. 92½.

Friday.—Barnet 7 p.ct. 114½, Bournemouth 4 p.ct. deb. 75½, 76½, Bristol 5 p.ct. 92, Commercial 98¼, Continental Union 128, 129½, 129¾, 130, European 18¼, 18⅝, 18⅝, 19½, Gas Light and Coke 19s., 19s. 1½d., 19s. 3d., 19s. 3⅜d., 19s. 4¼d., 3½ p.ct. 63¾, 3 p.ct. deb. 59⅝, 5 p.ct. deb. 101⅜, 101½, Imperial Continental 438, 440, 440½, 441, 442, 443, 446, Primitiva 33s. 6d., 33s. 7½d., 33s. 9d., 33s. 10½d., 34s., South Metropolitan 104¼, 6 p.ct. pref. 108½, Swansea 7 p.ct. pref. 102, Tottenham 3½ p.ct. 106½, 106¾, Wandsworth new 106. Supplementary prices, Croydon 5 p.ct. deb. 97, 5 p.ct. deb. (interest from April 30, 1929) 97, Yorktown (Camberley) and District new 5 p.ct. pref. 92½.

The outstanding feature of the Money Market was the weakness of the German Exchange. Sales of the mark from both Paris and Amsterdam brought about a rapid depreciation, and the Berlin rate closed at its worst point (20.58) on Friday, though there was a slight improvement on Saturday. Most of the Continental Exchanges moved against Sterling; the closing quotation being Italian lire 92.56, Dutch florins 12.07⅛, Spanish pesetas 33.71½, and Belgas 34.93¾. There was no change in French francs.

Treasury Bills were allotted at an average of £5 2s. 8·72d. p.ct., being 7·65d. p.ct. above the previous week's rate. Money in Lombard Street was in ample supply, and both old and new day-to-day loans were arranged at 4½ p.ct.

Silver was again easier on Chinese sales at 25½d. per oz.; but Gold was higher at 84s. 11½d. per oz.

The Bank Rate is 5½ p.ct., to which it was raised from 4½ p.ct. on Feb. 7. The Banks' deposit rate is 3½ p.ct., and the deposit rates of the Discount Houses are 3½ p.ct. at call and 3¾ p.ct. at notice.

FORTHCOMING ENGAGEMENTS.

May 1 and 2.—Eastern Counties Gas Managers' Association.—Spring Meeting at the Hotel Cecil, London.

May 2.—British Commercial Gas Association.—Scottish District Conference at Aberdeen.

May 2-3.—Iron and Steel Institute.—Annual Meeting at the Institution of Civil Engineers.

May 3.—London and Southern District Junior Gas Association.—Annual General Business Meeting at the Westminster Technical Institute.

May 4.—Midland Junior Gas Association.—Visit to the Leamington Gas-Works.

May 4.—Manchester and District Junior Gas Association.—Visit to the Blackpool Corporation Gas Department. Paper by T. Reynolds on "Works Extensions."

May 4.—Scottish Junior Gas Association (Eastern District).—Annual General Meeting in Edinburgh.

May 7.—National Gas Council.—Meeting of the Central Executive Board.

May 7.—Federation of Gas Employers.—Meeting of the Central Committee.

May 8.—British Commercial Gas Association.—Annual Meeting of the Eastern District at Peterborough at 3.30 p.m.

May 10.—British Commercial Gas Association.—Manchester District Conference at Southport.

May 10.—Southern Association of Gas Engineers and Managers.—Visit to Exmouth.

May 11.—Yorkshire Junior Gas Association.—Meeting at Leeds. Short papers by Messrs. H. E. Wilde (Bradford), S. T. S. Musgrove (Sheffield), and F. J. Jackson (Sheffield).

May 16.—Midland Association of Gas Engineers.—Visit to Shrewsbury.

May 16.—Midland Junior Gas Association.—Annual General Meeting in Birmingham.

May 16.—Wales and Monmouthshire District Institution of Gas Engineers and Managers.—Meeting at Cardiff.

May 24.—North of England Gas Managers' Association.—Annual Meeting.

June 19.—Association of Statutory Inspectors of Gas Meters.—Annual General Meeting in the County Hall, Westminster: President, Mr. H. N. Barrow, J.P.

July 5.—Manchester District Institution of Gas Engineers.—Visit to the Halifax Gas-Works and to the Works of Messrs. Drakes, Ltd.

Sept. 12.—North British Association of Gas Managers.—Annual Meeting at St. Andrews.

SPHERICAL GASHOLDERS.

By S. M. MILBOURNE, A.M.I.Struct.E.

(*Concluded from p.* 200.)

TEMPERATURE AND PRESSURE CHANGES.

Though the atmospheric temperature variations experienced in this country are not very considerable over comparatively short periods of time, their influence on the storage of gas in pressure containers should receive consideration. All gases have a tendency to expand or contract when subject to a rise or fall in temperature. It therefore follows that if a sphere charged to its maximum delivery pressure is subject to an increase in temperature, gas will be released to the atmosphere through the safety valve unless provision is made in the design of the container to withstand additional pressure. Should, however, the sphere be practically exhausted, and isolated from the gas main through the valves being closed, then a fall in temperature would tend to reduce the gas pressure in the container to below that of the atmosphere. Consequently air would be drawn in through the vacuum valve. The maximum pressure to which the sphere may reasonably be designed, and the minimum pressure to which it is permissible to discharge under isolation conditions, will now be investigated.

The change in temperature of the gas, and consequently the change in pressure, are perhaps of the greatest significance during the spring and autumn, as the maximum range in temperature experienced in this country during these periods is about 25° C. in 24 hours, according to records at the Meteorological Department of the Air Ministry.

Now the relationship existing between volume and temperature of a gas is given by Charles' Law, which states that a given mass of any gas expands by a constant fraction of its volume at 0° C. when its temperature is raised 1°, provided the pressure remains constant. This fraction, usually referred to as the coefficient of expansion at constant pressure, may be taken with sufficient accuracy as $\frac{1}{273}$. Then by considering Charles' Law in conjunction with Boyle's Law, it will be observed that the pressure coefficient is numerically equal to the coefficient of expansion. The equation representing the isothermals of the gas in terms of the temperature may therefore be expressed as follows:

$$p\,V = C\left(1 + \frac{t}{273}\right) = \frac{C}{273}(273 + t) \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where p = the Absolute pressure of the gas at volume V
C = a constant, and t = the temperature in °C.

Writing $\frac{C}{273} = R$ = a constant, and $(273 + t) = T$ = the Absolute temperature of the gas, then equation (1) may be reduced to a more convenient form thus:

$$p\,V = RT \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Then assuming the most unfavourable circumstance of temperature change is from −13° C. to 12° C. (difference of 25° C.), and substituting these values in equation (2), the following is obtained:

For a sphere with a nominal discharging pressure of 50 lbs. per sq. in.

$$\left.\begin{aligned} 64{\cdot}7\,V &= 260\,R \\ p\,V &= 285\,R \end{aligned}\right\}$$

Therefore p = 71 lbs. per sq. in. Absolute.

The maximum gauge pressure for design is then 56·3 lbs. per sq. in.

For a sphere having a nominal discharging pressure of 30 lbs. per sq. in. the maximum gauge pressure for design is found in a similar manner to be 34·3 lbs. per sq. in. The minimum pressure to which it is permissible to discharge the sphere under isolation conditions is 16·2 lbs. per sq. in. Absolute, or 1·5 lbs. per sq. in. gauge pressure. The above calculations are based on the assumption that the gas is dry. In most cases in actual practice, however, the gas is in a saturated condition with aqueous vapour and sometimes naphthalene. There are other hydrocarbons present, but most of these are present in such quantities that they are far removed from saturation conditions. The tension of aqueous vapour depends upon the temperature of the liquid from which it emanates, and is independent of the volume it occupies, provided the vapour is in a saturated condition. Then, since the increment of increase of the function representing the tensions at certain temperatures becomes greater for each degree rise, the condition of maximum increase in pressure due to the presence of aqueous vapour will be reached at the highest temperature difference which is likely to be recorded. Assuming this is from 15° C. to 40° C. (temperature difference 25° C.), then the increased pressure (p_2) in lbs. per sq. in., due to water vapour, will be

$$p_2 = \frac{\sigma\,(40°\text{ C.}) - \sigma\,(15°\text{ C.})}{51{\cdot}7} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

where σ = the tension of aqueous vapour in mm. of mercury.

Substituting values in the above equation, then

$$p_2 = 0{\cdot}82 \text{ lb. per sq. in.}$$

The maximum and minimum pressures are obtained by adding this result to the values found from equation (2) in which t has been taken at 15° C. to 40° C. Therefore, for containers having a nominal pressure of 50 and 30 lbs. per sq. in., the maximum gauge pressures are 56·4 and 34·7 lbs. per sq. in. respectively, while the minimum gauge pressure becomes 2·1 lbs. per sq. in. for all cases. The presence of naphthalene vapour does not make sufficient difference in pressure to warrant its being taken into account.

As condensed water vapour constitutes the major portion of the condensate, it is interesting to note the conditions under which condensation may occur when gas is compressed and eventually liberated from the sphere.

For the purpose of example, assume that a sphere is filled with gas at atmospheric pressure. Then the quantity of aqueous vapour present may be obtained as follows:

Let σ = the tension of aqueous vapour measured in mm. of mercury for any temperature t °C.
V = the normal volume of the sphere in c.ft.
v = volume of water vapour in c.ft.

Then

$$v = \frac{\sigma V}{760} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

Now it will be seen that, if the temperature remains constant and a further quantity of gas containing aqueous vapour is forced into the sphere, this vapour will condense, since the space inside the container is already in a saturated condition. The number of c.ft. of aqueous vapour deposited is found from equation (5) by substituting for V the volume of the further quantity of gas.

It then follows that the gas, on being liberated from the sphere and expanding, will be in a state of partial saturation only, so that no vapour will be condensed in the distribution mains unless a fall in temperature of sufficient magnitude takes place. If the gas in the container is at an absolute pressure of p_2 lbs. per sq. in., and is discharged into the mains at an absolute pressure of p_1 lbs. per sq. in., the quantity of water vapour (n) in c.ft. present in the discharged gas may be expressed as follows:

$$n = \frac{v\,p_1}{p_2} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

The graph fig. 6 has been prepared from equation (5) for various values of σ and t, up to t = 45° C., in which V = 1000 c.ft. Then, by obtaining the value of n in (6) for any range of pressure, the temperature at which saturation of the aqueous vapour takes place may be read from the graph directly.

From this, it will be seen that the gas leaving the sphere is very much drier than is otherwise obtained from either water-sealed or tankless gasholders.

It should be understood, however, that, while ordinary coal gas and water gas mixtures may be stored under pressures of 50 to 60 lbs. per sq. in. without any appreciable detriment in quality or loss in volume, yet in the case of oil gas the position is somewhat different, as there are a number of hydrocarbons present near the point of saturation at low pressures. Consequently, further experiments are necessary before any definite conclusions can be arrived at respecting the advisability of storing oil gas mixtures under high pressure.

GENERAL DESIGN.

The most convenient form of container for storing large quantities of gas under pressure is the sphere, owing to the fact that the surface represents the minimum superficial area which will enclose any given volume, and also that it is the strongest form of vessel for resisting internal pressures of constant intensity for any given thickness of shell.

The steel plates forming the shell of the container may be so arranged that all the vertical seams are struck from the great circle, while the horizontal seams divide the sphere up into zones, as shown in fig. 1. An alternative method of construction is to arrange the vertical and horizontal seams on the great circle so that the surface of the container is primarily divided into six spherical faces by two vertical and four horizontal diagonally opposed planes. The development of one face is shown in fig. 7.

This form of construction has the advantage of reducing the number of templates (the letters shown indicate the position of similar plates), and in cases where butt joints are used the curvature of these is equal in all directions. There is also less

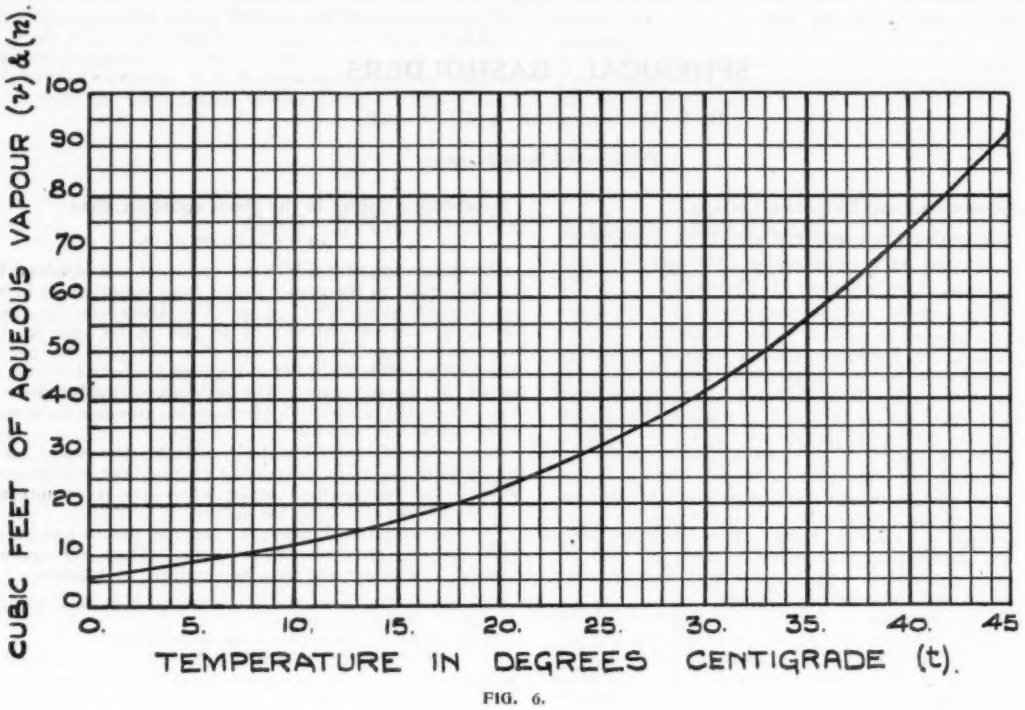


FIG. 6.

wastage in the shearing of the material, since the plates are nearly rectangular in shape.

The strength of the spherical container to resist the internal pressure may be obtained as follows :

Let f_t = the tensile stress in lbs. per sq. in.
p = the maximum gauge pressure of gas in lbs. per sq. in.
d = the diameter of the sphere in feet.
t = the thickness of plate in inches.

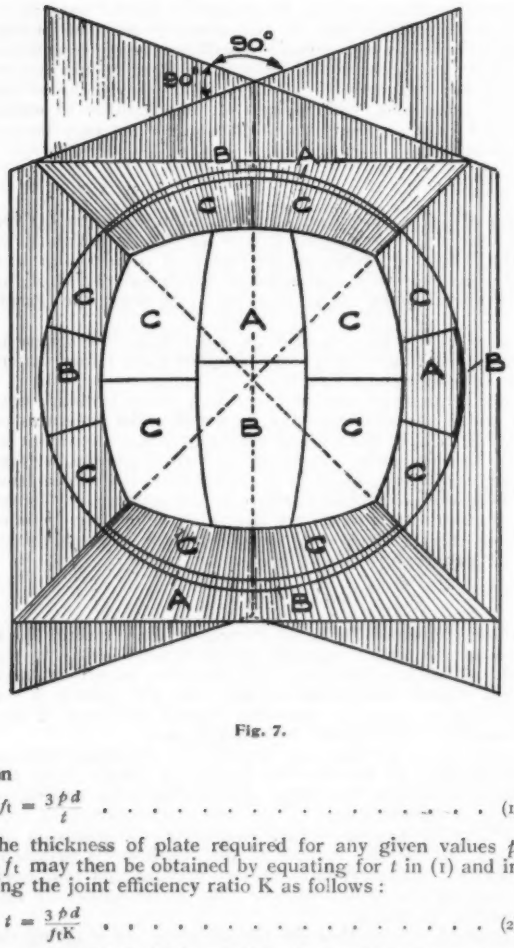


Fig. 7.

Then

$$f_t = \frac{3\,p\,d}{t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

The thickness of plate required for any given values p, d, and f_t may then be obtained by equating for t in (1) and introducing the joint efficiency ratio K as follows :

$$t = \frac{3\,p\,d}{f_t K} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

The value of f_t in (2) is usually taken as 16,800 lbs. per sq. in. for mild steel, which allows a factor of safety of 4 on the average ultimate tensile strength.

The number of chairs or cradles supporting the sphere depends upon the size of the container and the nature of the ground, and usually varies from four to twenty. The size of

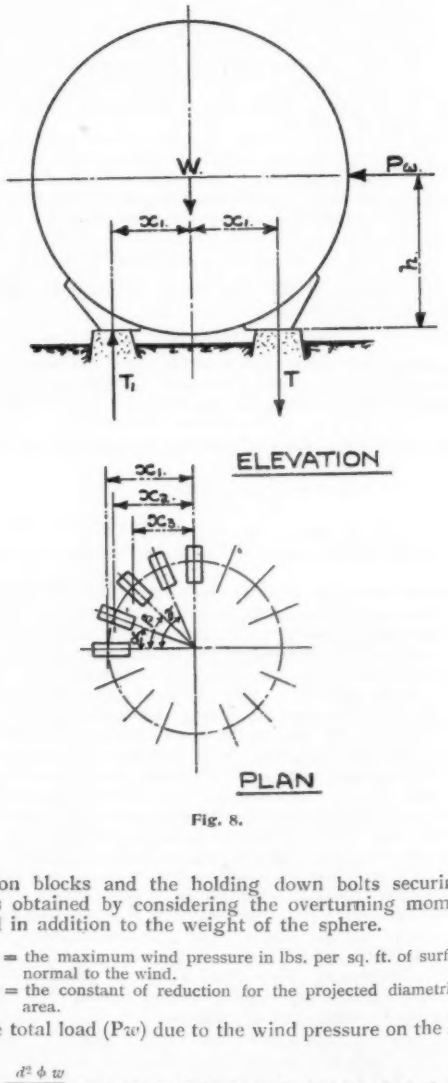


Fig. 8.

foundation blocks and the holding down bolts securing the chairs is obtained by considering the overturning moment of the wind in addition to the weight of the sphere.

Let w = the maximum wind pressure in lbs. per sq. ft. of surface normal to the wind.
ϕ = the constant of reduction for the projected diametrical area.

Then the total load (Pw) due to the wind pressure on the sphere will be

$$Pw = \frac{d^2\,\phi\,w}{4} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

If w be taken at 35 lbs. per sq. ft. and $\phi = 0{\cdot}31$ then the total wind load Pw in tons is

$$Pw = 0{\cdot}0038\, d^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

The condition of the various moments is shown in fig. 8.

The maximum pull T in tons on the foundation bolts in each block may then be obtained as follows:

Let h = the distance from the horizontal centre-line of the sphere to the top of the concrete foundation block.
x_1 x_2, &c. = the distances from the centre of the foundation blocks to the centre of the sphere.
W = the weight of the sphere in tons.

Then

$$Pw\,h = 2\,T\,x_1 + 4\,T\frac{x_2^2}{x_1} + 4\,T\frac{x_3^2}{x_1} + \ldots\ldots 4\,T\frac{x_n^2}{x_1} \quad . \quad . \quad . \quad . \quad . \quad (5)$$

Substituting for the terms x_2 x_3 x_n, &c., their trigonometrical values in relation to x_1 the following equation is obtained:

$$Pw\,h = (2\,T\,x_1 + 4\,T\,x_1\cos^2\alpha + 4\,T\,x_1\cos^2\beta + \ldots\ldots\ldots\ldots)$$

which may be reduced to

$$Pw\,h = 2\,T\,x_1\,(1 + 2\cos^2\alpha + 2\cos^2\beta + \ldots\ldots\ldots\ldots\ldots)$$

or in the form of a simple linear equation

$$Pw\,h = 2\,T\,x_1\frac{N}{4} = \frac{T\,x_1\,N}{2} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

where N = the number of foundation blocks.

Equating for T in (6) and adding algebraically $\frac{W}{N}$ the formula becomes

$$T = \frac{2\,Pw\,h - x_1\,W}{x_1\,N} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

The maximum thrust T_1 in tons on one foundation block will then be given by the equation.

$$T_1 = \frac{2\,Pw\,h + x_1\,W}{x_1\,N} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8)$$

PAINTING.

The most suitable colours to adopt in painting the container externally are those which reflect the sunlight as much as possible. Experience has shown that aluminium or white paint is the best. Dark colours such as red oxide absorb the light rays in the form of heat, and should therefore be avoided. If the interior of the sphere is painted, it should be coated with paint which is not likely to be acted upon by any of the constituents in the gas.

The superficial area A in sq. ft. of a spherical container may be found from the formula

$$A = \pi\, d^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where d = the diameter of the sphere in feet.

The supporting brackets beneath the sphere and the ladder usually constitute an extra 15 p.ct. to the area of the sphere.

CONCLUSION.

Though the foregoing investigation of the various problems which present themselves when considering the storage of gas under pressure have been dealt with somewhat briefly, the results obtained may be useful for future reference. There would appear to be little doubt that in a number of instances where district pressure is becoming a troublesome factor, due to the increasing consumption of gas, the installation of high-pressure gasholders would prove a successful means of overcoming the difficulty. Where the "Hortonsphere" is to be considered as a vessel of main storage, the fact that the discharged gas has a low moisture content will be appreciated.

PRESIDENTIAL ADDRESS OF THE MOST HON. THE MARQUESS OF HARTINGTON, M.P.

Society of British Gas Industries, Tuesday, April 30.

When I was asked to become your President for the year that is now ending, I expressed the fear that I should not be able to be of much use to you technically; and I am afraid that this fear has been fully justified. However, you are usually most kind and generous to your Presidents, and have not called upon me for much effort during my year of office. You, gentlemen, are a body of manufacturers who complete the organization of the great gas industry of this country—that is to say, the National Gas Council, the Institution of Gas Engineers, the British Commercial Gas Association, and yourselves, the Society of British Gas Industries.

The British gas industry is a vast national business with 179 millions of invested capital; it is a great employer of labour, employing 100,000 people with a wage bill of over £15,000,000 per annum; and it plays such an important part in our national life that it should be, as it is, well organized from every standpoint of its business. Your Society, of course, does not concern itself with politics or with Trades Union matters, but is a Society of Manufacturers who use their great technical knowledge for the good of the whole industry. It is only by means of societies such as yours that concerted efforts towards improvements can be made; and you have done a great work in maintaining and improving the technical efficiency of the various branches of manufacturing in which you are engaged.

From your laboratories, and from the keen intellects of the Members of your Society, have sprung the latest and most efficient methods of carbonization of coal—a matter of vast importance in view of the fact that the conservation of fuel is now, and will be in the future, a matter of vital importance. It is, I believe, a fact that the 782 authorized undertakings, from which returns have been received, used in 1927 no less than 17¾ million tons of coal, from which were obtained 12 million tons of solid smokeless fuel, 200 million gallons of tar, and 125,000 tons of sulphate of ammonia; and it is estimated that no fewer than 36 million people are being supplied with gas from the 9 million meters in use in this country.

AREA GAS SUPPLY INVESTIGATION.

The gas industry is undoubtedly a great national asset, and from that standpoint it is deserving of the closest study and investigation, as regards methods of carbonizing the coal and of distributing the gas produced. To investigate the best methods of use and distribution, my friend Sir Philip Cunliffe-Lister has appointed a Committee for "Area Gas Supply Investigation," to which, I am very glad to say, your Hon. Treasurer, Dr. E. W. Smith, has been appointed Chief Technical Officer. The work of the Committee will be to investigate the extent to which the gas available in the coke oven industry can be made use of by the gas industry. Whether this development will be along similar lines to that taking place in the electricity industry, or whether, as would seem more likely, it will be along different lines, owing to the fundamental differences in the two industries, I cannot say. The gas industry has been established for many years, and has evolved gradually; and its problems are in many ways different from those of electricity.

The necessity for an inquiry is undoubted, and the objectives are quite different from the objectives which the Electricity Commissioners have in mind for the electricity industry, though in both cases the objective must be to supply to the public the commodity at the lowest possible price. I am anxious to see the increased use of gas in industry, because such increased use will undoubtedly tend towards diminution of the smoke nuisance, make for cleaner cities, and mean much less heavy and unnecessary labour, thus adding materially to the health and well-being of those who live and work in industrial centres.

With regard to the investigation into methods of carbonization. This question has had considerable attention paid to it. Whether high-temperature or low-temperature carbonization be the better process, it is at least certain that the great gas companies are making the most careful study of the question, and that in their works, as well as at the coal mines and elsewhere, extensive experiments on a commercial scale are now in progress.

LOW-TEMPERATURE CARBONIZATION.

Many statements have been made about, and many things claimed for, the low-temperature process; and the leaders of the gas industry are dealing with the problem to-day with an open mind, determined to adopt whatever may prove to be the best process in the national interest.

Like many people, I have for some time been keenly interested in following what is taking place in the developments of the utilization of coal; and since I became your President this interest has been increasing, and I have had greater opportunities of improving my understanding of some of the technical problems connected with this vast subject.

It is not many years ago that the term "carbonization" as applied to the activities of the gas industry was almost unknown to the man in the street, but in recent years it has become one of the most commonly used words in the Technical Press, and is very frequently met with in the popular, and, perhaps I may add, the financial Press.

To you, gentlemen, it is the merest commonplace to say that by "carbonization" is meant a heat treatment of coal in order to produce a solid residue consisting primarily of carbon; but I am afraid that to the man in the street even this much is not absolutely clear. I believe that I am correct in saying that, if coal be heated out of contact with the air to temperatures below

300° C., moisture and carbon dioxide are liberated, leaving the coal in much the same condition as before, but free from these two products. If, however, coal be heated to temperatures up to about 600° C., then further products are liberated, and a residue is left consisting of carbon, ash, and material which would be volatile if subjected to higher temperatures than 600° C. This volatile material may be present in the carbonaceous residue to the extent of 10 p.ct. to 14 p.ct. The solid material produced containing these constituents is, when heated to 600° C., easily ignitable, and burns with much less smoke than raw coal. The process of producing this solid material is that generally known as low-temperature carbonization. It would not appear to be a complete or true carbonization, but a semi-carbonization. About 75 p.ct. by weight of the original coal appears as solid fuel. There are also produced up to 20 gallons per ton of tar oils, and up to 3500 c.ft. of high calorific value gas, as against a very much greater quantity of gas produced at a higher temperature.

I must not be understood, of course, as meaning that the process I have described is the only low-temperature process. A large number of processes have been developed which vary very considerably in their technique; but broadly speaking this is the low-temperature carbonization process.

Market for Cheap Slacks.

It is, of course, the object of all these processes to make a profit from the treatment of coal; or, to put it in another way, to make a better use of the properties of coal than can be made by burning it raw. The difficulties through which the coal industry has been passing during the last few years have given a great stimulus to interest in this matter; and the attempt is being made to find a remunerative outlet for the cheap slacks produced in all mines to a greater or less degree. It must be patent to anyone studying the subject that, if coal is to be displaced for domestic purposes by an improved solid smokeless fuel, the new fuel will have to be sold at a price little, if any, more than the ordinary domestic coal, and be low both in ash and in moisture. The cheap slacks that have been available are mostly high in ash, and the low-temperature fuel available from such coals will not find a ready market unless the coal used is well cleaned from ash. This operation would not appear to be a difficult or expensive one, but the further fact evolves that immediately the demand for these cheap coals is increased, whether for the purpose of low-temperature carbonization or for the production of hard coke in coke ovens, the prices of such material will inevitably rise. If low-temperature carbonization be developed to any large extent under these conditions, the mining industry will undoubtedly reap a material benefit; but with the increased cost of washed coke and slacks, the attraction to the domestic consumer will be reduced, and it will be all the more difficult to make any process of low-temperature carbonization a commercial success, except in special circumstances.

Products from Low-Temperature and High-Temperature Carbonization.

The oils produced during low-temperature carbonization have had values attached to them which in many cases would not appear to be justified at present if the quantities produced were very great. I think I am right in saying that the best authorities assess these oils at having a value approximating to that of fuel oil.

It has been suggested that the gas produced would be of great value to the gas industry as an enriching gas. The difficulties of applying this suggestion are greater than would at first sight appear, and, indeed, I think that it cannot be applied generally. On the thermal basis, gas undertakings are enabled to supply that gas which they can best produce at the lowest cost, and they can adopt the calorific value which best suits their own particular method of gas production. It is therefore unnecessary to have to enrich as a regular thing. A low-temperature plant installed on a gas-works for the purpose of supplying enriching gas could only be justified if the enriching gas could be supplied at a cost per therm no greater than that attained already, and subject to its being possible to use continuously and efficiently the total output of enriching gas. This may not be at all readily attained. The high-temperature process of carbonization as developed by the gas industry has for its primary object the production of gas for use in towns. The quantity produced per ton of coal expressed as therms is approximately three times that produced at low temperature. The capital cost of high-temperature gas-making plants, per therm of gas made, is, I believe, about the same in either case. The amount of coke produced is about 10 p.ct. less at high temperatures than at low temperatures. The amount of tar produced at high temperatures is about two-thirds of that at low temperatures; but as this tar can be used for road purposes after a simple treatment, it has a higher value than fuel oil. Ammonia is also a bye-product of the high-temperature process, and assists in reducing the cost of the production of gas, whereas no ammonia can be produced at a profit by the low-temperature processes.

The high-temperature process can produce a coke containing less than 2 p.ct. of volatile matter. This coke is used extensively in industry and for domestic purposes; and, with the development of central heating boilers, this latter outlet should be materially increased. I believe that it would be a great advantage to the gas and coal industries if all gas engineers were to decide to buy nothing but low ash coals; and if the demand for cleaned coals were universal in the gas industry, the cost of cleaning would, of course, be very largely reduced, and the resultant coke would be a great deal more attractive to the domestic user than much of the coke used to-day. The reason for this will, of course, be obvious to you, gentlemen. At present only a comparatively limited number of gas engineers demand cleaned coals, and the cleaning has to be carried out especially for them, whereas, if the demand were universal, the cost could be largely reduced.

A great deal has been done in the past in connection with the study of methods for the improvement of the quality of coke, from the point of view of the domestic user and for use in the open grate. But it appears to me, after perusing the records of the Smokeless Fuel Conferences, the Carbonization Conference, and the World Power Conference, that the primary consideration is the production of coke low in moisture, sufficiently low in ash, and properly graded for the purpose to which it is to be put. I am convinced that even now there is on these lines a considerable future for coke for domestic purposes.

As time passes, the question of the ignitability of coke as compared with coal should become of less and less importance, as the facilities available for the use of gas lighting devices for coke or coal fires become better known and more universally adopted.

I have been much interested in the development of these

THE PRESIDENT,

The Most Hon. the Marquess of Hartington, M.P.

The Marquess is the eldest son of the Duke of Devonshire. He was formerly connected with the Staveley Coal and Iron Company, over whose Chesterfield Works he conducted King Faisal of Iraq. He is Hon. Colonel of the 6th Sherwood Foresters, and Captain in the Derbyshire Yeomanry. He saw service in Egypt, France, and the Dardanelles, and was twice mentioned in despatches. He was a member of the British Peace Delegation to Paris in 1919.

devices, and I believe that I am well within the mark when I say that not only is a gas lighter for a coal or coke fire a great labour saver and cheaper than the use of sticks or patent lighters, but that it would materially diminish the smoke nuisance from the domestic grate. It will not, of course, do away with it altogether; but anyone who lights a fire will observe that it makes more smoke when it is first lit than at any other time, and the smoke given off by a mixture of wood or a resinous compound with coal is greasier in its nature than that given off by coal alone. And I believe that the greater use of gas lighting for domestic fires would be of material benefit, by securing a quicker and more thorough combustion of the coal, in diminishing the smoke nuisance.

An Economic Process.

From what I have said, I think it will be gathered that the gas industry is carrying on a process which is economically sound; its continued development and increasing success confirm this view. This is due almost entirely to the fact that high-temperature carbonization results in products which in the

aggregate have a higher net financial value than those from low-temperature carbonization. Consequently, if low-temperature carbonization is to be developed on a large scale, in which the primary objectives are the production of solid smokeless fuels, tar oils, and gas, it can only be as an adjunct to those industries which can provide a ready outlet for the subsidiary products whatever they may be. Consequently, taking a long view, it would appear that, though there may be cases where the process of low-temperature carbonization can be run successfully as a comparatively small subsidiary part of the operations of gas undertakings, the future does not hold very much prospect for the wholesale development of this system; but everything depends on:

(1) The extent to which gas is still further applied as a domestic fuel.

(2) The extent to which coke itself is improved, as produced in high-temperature carbonization systems, to fulfil the requirements of the domestic user.

I hope I have said enough, gentlemen, to show that, whatever may be the future of the low-temperature process, it has been, and is being, thoroughly investigated by those most competent on the subject, and that the accusations which have so frequently been made by politicians and by others that the difficulties of the coal industry are due to its failure to grapple with new problems are absolutely unfounded.

I am afraid I must add that, though there may well be a great future for the low-temperature process, it does not, and cannot, offer any short cut to a solution of the difficulties which have beset the coal trade in the past, as some optimistic politicians or interested financiers have affirmed.

CARBONIZING DEVELOPMENTS IN SCOTLAND.

By E. W. SMITH, D.Sc., F.I.C., and T. CAMPBELL FINLAYSON, M.Sc.

[Paper presented to the Scottish Junior Gas Association (Western District) on the occasion of their Visit to the Dawsholm Gas-Works, Glasgow, April 27.]

In a paper which one of the present writers had the pleasure of presenting to you a little more than two years ago, a brief reference was made to the fact that the Dawsholm Works of the Glasgow Corporation Gas Department was likely to be the scene of important developments in carbonizing practice in Scotland. To-day, you are to see the practical outcome of the enterprise of the Gas Department in reconstructing their works on what can certainly be claimed to be a unique combination of plant on any gas-works in the world. We very greatly appreciate the honour you have done us on this occasion by allowing us to put before you a short paper describing by word and by illustration the main features of the new carbonizing installation; and at the outset we make grateful acknowledgment to Mr. J. W. McLusky, Engineer and General Manager of the Gas Department, and his Engineering Assistant, Mr. J. F. Harrison, to whose specifications the plant was built, and without whose permission this paper would not have been possible.

The title of this paper refers to carbonizing developments in Scotland. One thing is abundantly clear to-day—namely, that the gas industry cannot afford to stand still. Pressed by competition from other forms of heat, power, and light, faced with alternative sources of supply of gas and solid smokeless fuel, the gas industry must lead in the field of development. The first essential is that gas should be produced at the lowest possible cost, and, in order to do this, it is necessary to take advantage of new ideas. Scottish gas undertakings have, in many ways, shown themselves receptive of new developments; and no more striking example can be given than the spirit of venture backed by confidence which led the Glasgow Gas Department in 1919 to go in for a wholesale reconstruction of their Provan Works, by the erection of a single plant of W-D continuous vertical retorts with a carbonizing capacity of 1356 tons of coal per day. It must be as great a satisfaction to them as to the Company which built it that this plant has already carbonized over 2,300,000 tons without so much as one producer lining being repaired, and without any retort reconstruction. It is the same spirit of enterprise which lies behind the conception of the installation you are to see to-day.

A gas undertaking depends primarily upon the sale of gas, but the price at which it can sell this gas depends largely upon the price obtainable for the solid residue in the form of coke. When the Glasgow Gas Department decided to reconstruct their Dawsholm Works, this fact was kept in mind. Owing to their large demand for coal, they must buy it from a large number of Scottish collieries, with the result that the quality varies considerably. In comparison with English coals, Scotch coals are, generally speaking, of relatively low caking quality. This makes them particularly suitable for giving maximum throughputs and relatively high thermal yields, when treated in continuous vertical retorts. On the other hand, treatment of these coals has the disadvantage that the small material tends to remain in the form of breeze after carbonization. This small material, or "breeze," is more difficult to dispose of, and secures a lower price than large coke. In addition, it has been shown on a number of occasions that the carbonizing capacity of a continuous vertical retort plant can be increased above the normal figure by removing the fine coal.

In 1926 the Gas Department therefore invited tenders to comply with a specification which stipulated that the coal smaller than 1 in. cube should be screened from the larger coal, and after washing and blending with suitable caking slacks be carbonized in separate retorts. In January, 1927, a contract was placed with the Woodall-Duckham Company for a plant consisting of two benches of continuous vertical retorts and two benches of intermittent vertical chambers, together with coal washing, blending, and handling plants. The combined plant has a carbonizing capacity of 587 tons of coal per day, and can produce 9,000,000 c.ft. of gas per day of a calorific value of 475 B.Th.U. per c.ft.

Before describing the plant in detail, it may make the matter clearer to consider a flow sheet of coal. The combination of continuous vertical retorts and intermittent vertical chambers has been evolved to give satisfactory gas output and yield per ton with improved coke quality. Fig. 1 illustrates

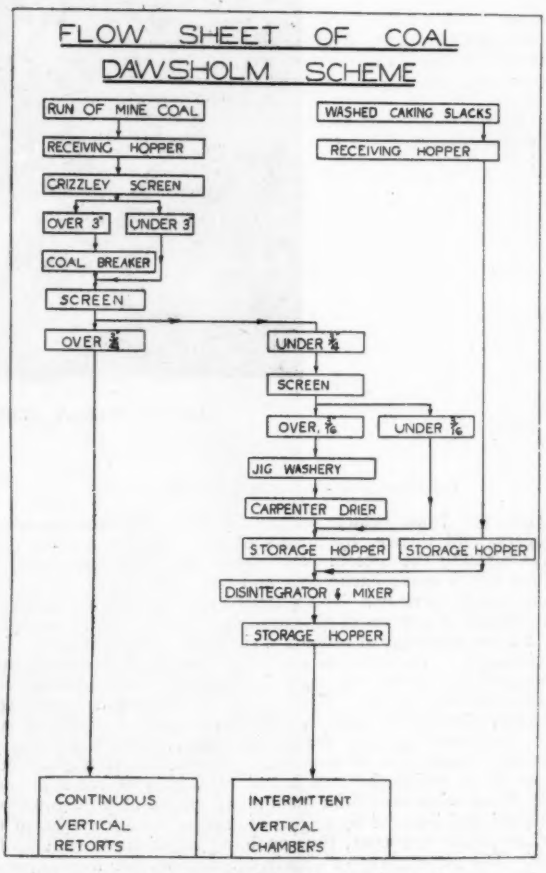


FIG. 1.—FLOW SHEET OF COAL.

diagrammatically the flow sheet. Run-of-mine coal is brought in railway wagons to the rotary tipplers at the end of the coal store, and is discharged into receiving hoppers situated below the rails. The coal is then fed by means of sure-feed regulators on to one of two grizzly screens. The material below 3 in. is screened out. The material above 3 in. passes through a coal breaker and joins the coal which has by-passed the breaker. The whole of the coal is then conveyed to another grizzly screen,

whereon the material below ¾ in. is screened out. The screened coal above ¾ in. is then conveyed to a gravity bucket conveyor and raised to the overhead storage hoppers above the two benches of continuous vertical retorts, which work on screened coal under steaming conditions. The small coal below ¾ in. passes to a Hummer screen in which the material below $\frac{3}{16}$ in. is screened out. The fraction between ¾ in. and $\frac{3}{16}$ in. is washed in a jig washer, allowed to drain, and then finally dried in a Carpenter centrifuge. The washed and dried material is then mixed with the fine coal below $\frac{3}{16}$ in. and conveyed to storage bunkers.

As this washed small coal is, to a large extent, non-caking, its coking properties are improved by blending with caking slacks. These are brought to the works in railway wagons and elevated to special compartments of the storage bunkers. The washed small coals and the caking slacks are discharged from their respective storage hoppers with controlled rate of discharge on to a band conveyor, and travel to a disintegrator mixer which intimately blends the two coals. The blend is then elevated to storage hoppers above the intermittent vertical chambers, which are operated to make high calorific value gas and high quality coke from the blend. Arrangements are made that all the coke produced in the intermittent vertical chambers is dry-quenched in a Sulzer cooling plant, delivered to a screening plant, and made available for sale; the heating of both plants being effected by some of the coke made in the continuous vertical retorts.

For simplicity, it is proposed to follow the features of the installation in the same order as described above.

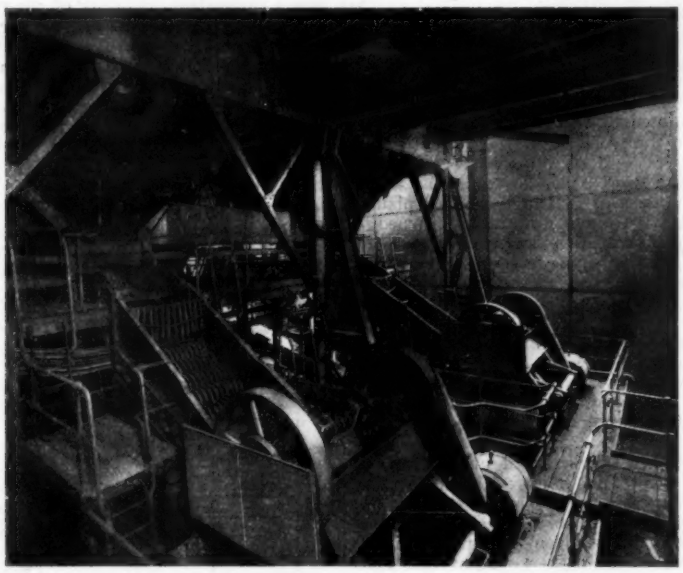


FIG. 2.—GRIZZLY SCREENS AND COAL BREAKERS.

Grizzly Screens and Coal Breakers.

The coal from rotary wagon tipplers falls into reception hoppers, and thence, by means of sure feeders consisting of trays forming the bottom of the receiving hopper mounted on rollers which move backwards and forwards, on to one of two rotary grizzly screens. The screens are clearly shown in fig. 2, and consist of a series of discs mounted on shafts and spaced so as to leave openings of a definite size. The position of the coal is changed by the revolution of the discs, with the result that the small coal passes through the openings and the large coal passes over the screen. The large coal passes to a Norton coal breaker, the special function of which is to crush the coal into pieces not greater than 3 in. cube, without causing an excessive formation of fine dust. It consists of a plate conveyor on to which the coal is fed, while a plate of 2 in. cast iron, fitted with vanadium steel picks spaced at 3 in. intervals, is raised and lowered by means of cranks to within 2 in. of the surface of the conveyor, thus enabling the picks to split up the coal. The plate conveyor slowly travels forward, thus exposing fresh coal to the action of the picks.

Continuous Vertical Retorts.

There are two benches of Woodall-Duckham continuous vertical retorts, each containing twenty-two 103 in. retorts. Each bench is heated by a battery of five independent step-grate producers arranged at ground level at the side of the bench, but connected to the battery of retorts by means of a common producer gas distributing main. The waste gases from the battery of retorts are collected in a common collecting main, and pass to the waste-heat boilers. The settings are of the non-recuperative type.

Each retort in this type of plant is under independent control, being provided with its own producer gas, secondary air, and waste gas flue dampers, thus forming a complete heating unit. The retort faces and the combustion chambers are built of first-class silica brick for the full depth of the combustion chambers. In order to provide means of varying the temperature at the top and bottom of the combustion chambers, additional secondary air inlets, controlled by separate dampers, are provided. Loss of heat through radiation is reduced to a minimum by insulating the side walls and tops of the benches with insulating bricks and hollow blocks, packed with slag wool.

The retorts are 25 ft. long and of rectangular tapered shape, heated by the combustion of producer gas in a series of vertical combustion chambers built at each side of the retort, the direction of the combustion being downwards. Coal is fed from the overhead storage hoppers into auxiliary coal hoppers which are connected to the retorts by means of mouthpiece castings. The top charging platform at Dawsholm is shown in fig. 3. It will be noted that on the 103-in. retorts there are two coal valves to each auxiliary coal bunker. The descent of the coal through the retort is governed by means of the standard Woodall-Duckham extractor situated at the bottom of the retort, the speed of the coal travel being such that the coal entering at the top of the retort is gradually carbonized and converted into coke by the time it arrives at the bottom. The gases and various bye-products are evolved from the coal and pass off through the offtake pipes, fitted at the outside end of each auxiliary coal hopper, into the collecting mains. There are two collecting mains for each continuous retort bench, one on each side.

The residual heat in the coke is utilized for the formation of water gas within the retort; steam being introduced through nozzles fitted into the curved bottom plate of the coke extractor box. The coke is discharged dry and cool.

Fig. 4 shows the retort house floor level of one of the continuous vertical retort benches. The coke receiving hoppers depicted are of two hours' capacity. The bottoms of the receiving hoppers are closed by water-sealed gas-tight doors. The coke is removed from below the retorts in rope-hauled skips.

Battery of Producers.

Each bench of continuous vertical retorts is heated by a battery of step-grate producers so designed as to give ample grate area. The producers are fitted with doors so that they may be worked under pressure, and thus maintain a supply of producer gas to the settings when called upon to gasify inferior fuels. The producer battery is strongly braced, and heat loss is minimized by insulating the side, back, and front brickwork with insulating bricks. Fig. 5 gives a general view of one of the batteries of step-grate producers. The producer gas travels from the producers by means of four uptake flues into a common external distributing main which extends the length of the retort bench and which is built of steel plates with a 7½ in. lining, the inner 4½ in. being firebrick and the outer 3 in. silocel. Opposite every pair of retorts a rectangular branch connects the producer gas main with the retort bench.

In comparison with the older designs of plant, in which the

producers formed a portion of the retort bench, the advantages are:

(1) The producer battery can occupy any position relative to the retort battery to suit the shape of the space available.

(2) Repairs to producers can be carried out without the cooling of a single retort, four of the five producers being sufficient to supply the producer gas to heat all the retorts in one bench.

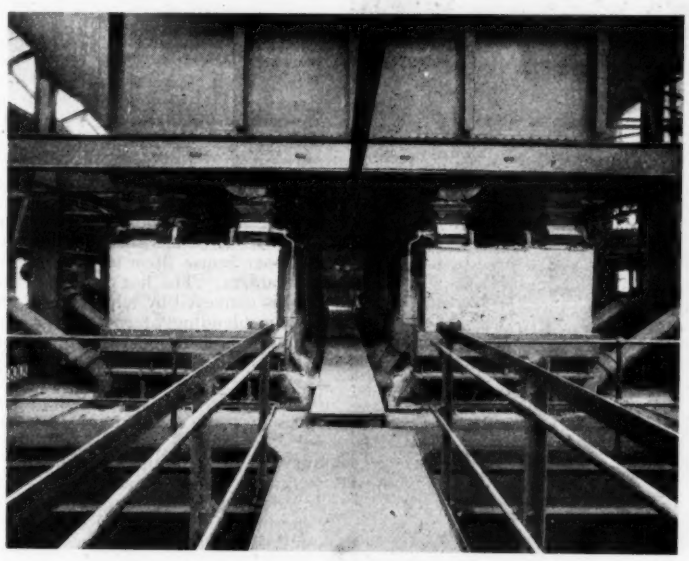


FIG. 3.—CONTINUOUS VERTICAL RETORTS. TOP CHARGING PLATFORM.

(3) A greater output of gas per square foot of ground space is obtained.

(4) The compactness of the retort battery reduces to a minimum heat loss by radiation.

The retorts are the largest yet put to work in Scotland; each having a daily carbonizing capacity of 10 to 11 tons.

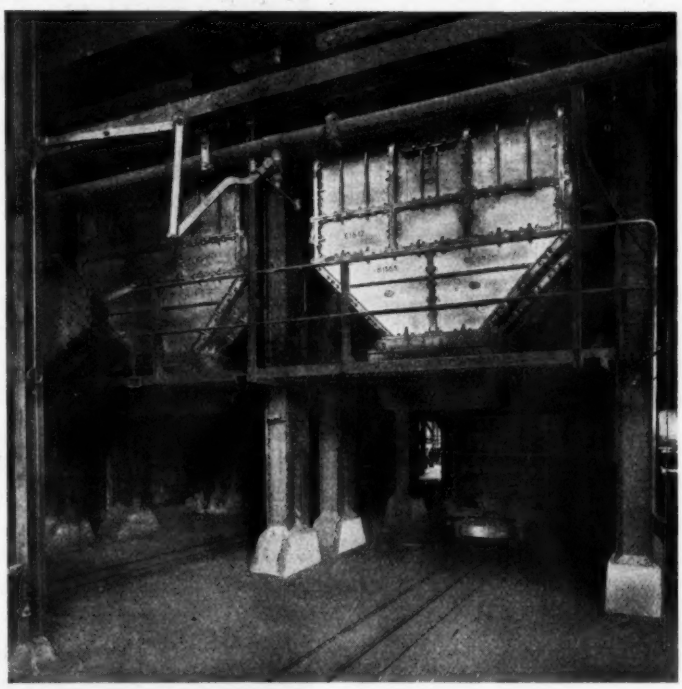


FIG. 4.—CONTINUOUS VERTICAL RETORTS. RETORT HOUSE FLOOR LEVEL.

Construction is about to start on a battery consisting of 28 of these large retorts for the Aberdeen Corporation Gas Department.

WASTE-HEAT BOILERS.

The waste gases from each vertical retort bench are collected in a steel waste gas main lined with 9 in. firebrick, 4½ in. insulating firebrick, and 4½ in. of silocel. The gases are led either to a chimney for working the settings on natural draught, or to the waste-heat boiler plant. There are three boilers, any one of which is capable of dealing with the waste gases from one continuous vertical retort bench.

Each of the boilers is of the horizontal fire-tube type, 9 ft. 6 in. diameter, fitted with tubes of 1½ in. internal diameter, and will produce 14,000 lbs. of steam per hour at a working pressure of 160 lbs. per sq. in. The major portion of the steam is employed for steaming the continuous vertical retorts and working the producers, the balance being superheated and delivered into the works mains.

We must now revert to our flow sheet, and follow-up what happens to the small run-of-mine coal (¾ in. downwards) which passes through the grizzly screen.

The raw coal ¾ in. to 0 in. is distributed by means of a screw conveyor on to a Hummer screen, shown in fig. 6. The screen is of the electric vibro type. Magnets operated by alternating electric current cause a very large number of vibrations per minute to be transmitted to the coal on the screen, and in this particular screen the material $\frac{3}{16}$ in. to 0 in. passes through.

Coal Washery.

The coal ¾ in. to $\frac{3}{16}$ in. is fed direct into the washery, which is of the Baum type. The separation of clean coal from refuse is obtained by means of a pulsating current of water, the pulsations being produced by means of plungers. The raw coal is fed on to a screen plate in the washing compartment, and is carried along to the outlet end by means of water which is admitted to each of the three plunger compartments separately. The pulsations cause a bed to be formed on the screen plate; the lower portion being composed of refuse and the upper portion of clean coal. The refuse either falls through openings in the screen plate at the bottom of the box or passes through an adjustable refuse gate at the outlet of the box. The clean coal flows over a weir at the outlet end of the box. Fig. 7 shows the coal washing box. The clean coal is conveyed from the washery box on to a jigging dewatering sieve, and thence by means of a chute into a W-D Carpenter continuous centrifugal drier of capacity 25 tons per hour, wherein the coal is finally dried. It is then elevated to storage bunkers. The refuse is collected in a water-tight screw conveyor under the washing box and delivered into a draining elevator, whence the refuse is conveyed to a bunker situated at the coal receiving station, arrangements being made for the shale to be loaded into railway wagons.

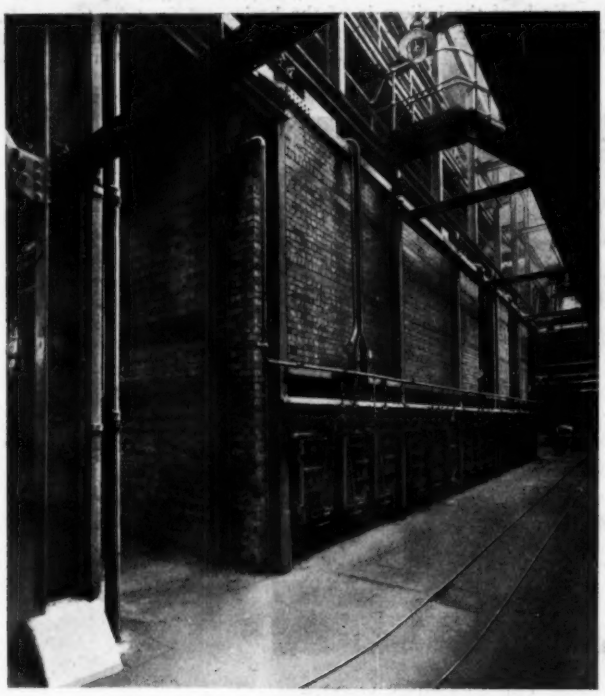


FIG. 5.—CONTINUOUS VERTICAL RETORTS. BATTERY OF STEP-GRATE PRODUCERS.

Coal hoppers have been provided for storing separately the washed coal and the caking coal. The hopper is constructed of reinforced concrete and has a capacity of 600 tons of caking coal and 300 tons of washed coal. The washed coal and the caking coal are discharged from their respective storage hoppers in the required proportions, by means of mechanical feeders for controlling the rate of discharge, on to a 100 ton per hour band conveyor, which feeds the mixture of coal into a Carr type disintegrator which serves both as disintegrator and mixer. The fine blended coal is then raised by the gravity bucket conveyors to the storage hoppers above the intermittent vertical chamber benches.

Intermittent Vertical Chambers.

There are two benches of W-D intermittent vertical chambers. Each bench consists of four settings each containing six chambers, one recuperator, and one producer. Each setting is separate from the next, a straight joint being provided between them so that any one may be heated up or cooled down without affecting the adjoining settings. The chamber faces and combustion chambers are built of first-class silica for a depth of just over 14 ft. The producers are of the step-grate type; and the recuperators are built on the counter-flow principle. The combustion system is efficient, and simple to control. The chambers are of rectangular form with rounded corners and with a uniform taper from top to bottom. The capacity per chamber is approximately 2¼ tons of coal.

For conveying the coal and breeze from the storage hoppers to the chambers, a charging machine is provided, which is shown in fig. 8. This illustration gives a general view of the coal charging platform in one of the Dawsholm benches of intermittent vertical chambers. The charging machine has two compartments, one for coal and a small one for coke breeze. When charging a chamber, a pad of breeze is first dropped on to the bottom door for the purpose of keeping the latter cool and to prevent any coal lying in the chamber below the bottom combustion chamber. Then a measured charge of coal is introduced, and the top doors, which are self-sealing, are closed. The offtake pipes are then opened up to the collecting main. Each chamber has a separate offtake and seal pot, which may be seen in fig. 9. Sprays are provided for the offtakes during carbonization.

When carbonization is complete, the gas offtake is closed, and the coke dropped from the chamber by opening the bottom door. Each chamber is fitted at the bottom with a door which can be swung back to allow the charge to fall out. The doors are operated by hydraulic rams. These move a rack backwards and forwards horizontally. By a pinion wheel and clutch, the movement of this rack is communicated to the shafts carrying the doors. After the weight of the door has been taken by the hydraulic pressure, the catches are released from the door. The pressure control lever is thrown over, the door swings over, and the hot coke drops from the chamber. Fig. 10 is a view of the chamber house floor level, showing the bottom door operating mechanism. The hot coke from the intermittent vertical chambers is conveyed by telpher to the Sulzer coke-cooling plant.

True blending of coal necessitates fine crushing to intermix the various coal constituents. Static carbonization is especially suitable for treating such material; and from the gas engineer's viewpoint the static plant which gives the best all-round results is the intermittent vertical chamber. In comparison with other types of static plant, it gives a wide flexibility as regards both calorific value of gas and output. The calorific value is altered by varying the number of hours during which the charge is steamed; output is altered by variation of carbonizing period. In addition, intermittent vertical chambers give a larger output per unit of ground space than horizontal retorts, together with low labour and maintenance costs.

Coke Handling.

The coke handling arrangements in this installation are worthy of note. The coke from under the continuous vertical retorts and intermittent vertical chambers is removed in skips by automatic rope haulage. The skips are then lifted by one of two electric monorail telphers which deal with the whole of the coke from the two installations. For supplying producer coke, the telphers take the cool vertical retort coke and deliver it into overhead storage hoppers which supply fuel for both continuous and intermittent vertical chambers. In order

FIG. 6.—HUMMER SCREEN.

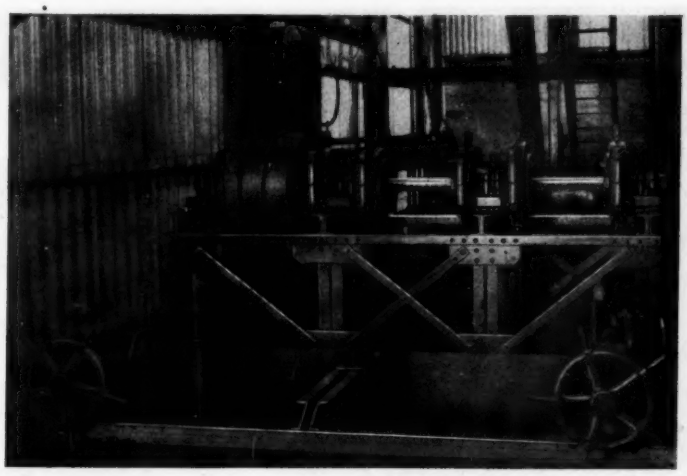


FIG. 7.—COAL WASHERY.

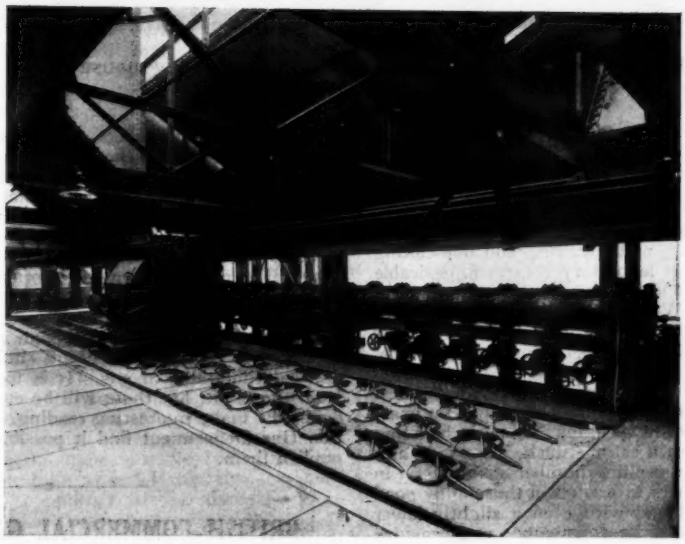


FIG. 8.—INTERMITTENT VERTICAL CHAMBERS. COAL CHARGING PLATFORM WITH CHAR ING MACHINE.

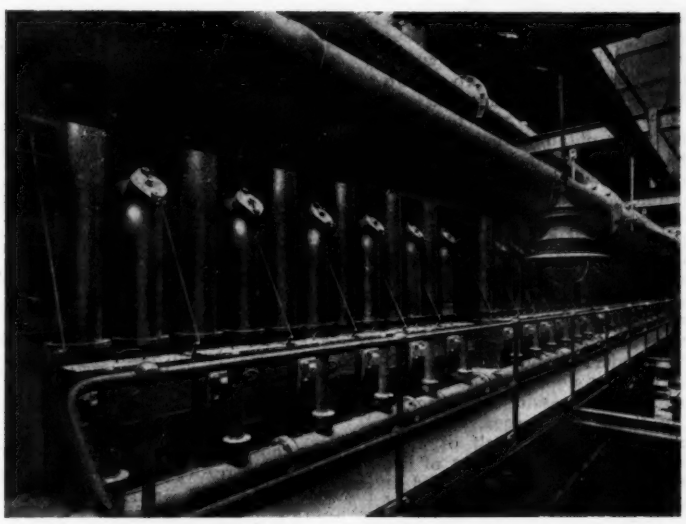


FIG. 9.—INTERMITTENT VERTICAL CHAMBERS. SEAL POT PLATFORM (INDIVIDUAL POTS).

that screened coke only shall be fed to the producers, the hoppers are fitted with bar screens. The screened producer fuel is fed through chutes into monorail charging skips. The breeze is elevated and discharged into overhead breeze hoppers and is used for providing the breeze pad of the intermittent vertical chambers.

The telphers also take the surplus coke from both continuous and intermittent plants to either of two screening stations. In each case the coke is stored in the hoppers in the form it is received from the plant, and is screened direct into railway wagons or trucks as required. The screens are of the rotary type and arranged to separate the coke into sizes—breeze under

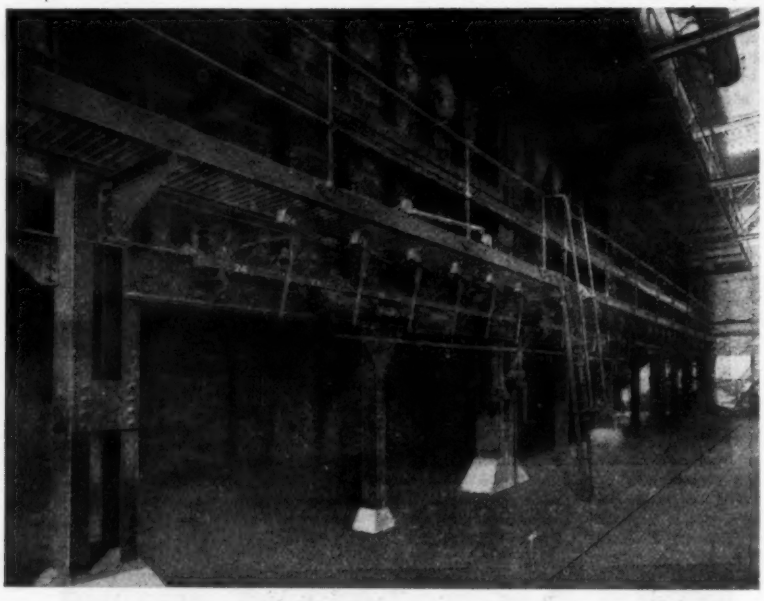


FIG. 10.—INTERMITTENT VERTICAL CHAMBERS. CHAMBER HOUSE FLOOR LEVEL, SHOWING BOTTOM DOOR MECHANISM.

⅜ in., small coke ⅜ in. to 1½ in., and large coke over 1½ in. Arrangements are made for excess coke to be stored in the yard.

Blending.

Coke quality from the intermittent vertical chambers depends upon the correct blending of the caking and non-caking constituents. Some measure of laboratory control is desirable in determining the correct proportions; and the authors have found the test known as the "Woodall-Duckham swelling number test," of considerable value. This was described in the Coke Competition Number of the "Gas Journal," Nov. 9, 1925.

The actual swelling number which corresponds with the best coke from a blend of two coals depends naturally upon the exact nature of the coals; but generally speaking, if one is blending a Scotch non-swelling coal with a caking slack, we should aim at carbonizing a blend giving a swelling number of at least 3 in the intermittent vertical chambers to produce a thoroughly good coke. With certain coals, a blend with even a slightly lower swelling number would give a satisfactory coke; and provided the blend gives a caking index above 10 as determined by the Fuel Research Board method, satisfactory results may be expected under conditions of static carbonization. The work of the Fuel Research Board in connection with the survey of Scottish coals will be of great value in this connection, and we understand that the Fuel Research Board are to keep in touch with these blending developments.

An interesting feature of the plant is the extent to which scientific control instruments have been employed. To ensure correct pull at the retorts, relay governors actuating butterfly valves have been installed in the foul mains, two for each bench; a chart of the pressures being obtained on recorders. Automatic weighing machines have been provided to weigh the coal delivered by the gravity bucket conveyors into the overhead storage hoppers. An automatic machine records the coke supplied to producers. Volume recorders measure the gas volume from each bench. Recording gauges show the inlet and outlet pressures on each waste-heat boiler.

Another novel feature is the "safety first" methods employed for preventing damage by "flooding" of the somewhat complicated coal handling arrangements. By the pushing of a button on the switchboard, the various elements in the sequence of operations start up in the correct order. Should any element of the sequence not start, or after starting stop, no element near the coal supply will work. Further, the pressing of a second button will stop the elements in the correct order, but with sufficient lag to allow each element to clear itself of coal. Almost 10 minutes after the button is pushed, the last of the elements stops. In addition, emergency wires are provided at various points so that in the case of any accident the whole coal handling plant can be stopped at once.

At the outset of this paper the statement was made that the new Dawsholm plant represented a unique combination of plant. In conclusion, it may be desirable to summarize the special features:

By having a choice of carbonizing plant, it is possible to supply each plant with the type and size of coal giving the best all-round results. This is effected by operating the continuous vertical retorts on coal above ¾ in. under steaming conditions and by treating the small coal, suitably blended, in the intermittent vertical chambers. The combination gives the maximum yield of gaseous therms per ton of coal.

A high yield of gaseous therms does not necessarily mean cheap gas, but when a high thermal yield is obtained, together with much-improved quality coke, the price prospects are distinctly favourable. The Dawsholm combination makes it possible to produce a high thermal yield together with high quality coke. The product from the intermittent vertical chambers being made from washed and blended coals should establish a high level in coke quality.

Thus the combined plant has an exceptionally wide range of flexibility as regards gas output, choice of coal, quality of coke, and calorific value of gas. It is too early to speak of results from the plant, but these will be eagerly awaited and will undoubtedly make interesting reading when the Glasgow Corporation Gas Department find it possible, at some future date, to publish them.

BRITISH COMMERCIAL GAS ASSOCIATION.

Manchester District Conference.

The following is the programme of the Manchester District Conference of the British Commercial Gas Association, which will be held at the Prince of Wales Hotel, Southport, on Friday, May 10. Alderman E. Trounson, J.P., will preside.

Morning Session.

10.30 a.m. Welcome by the Mayor, and opening remarks by the President of the Conference.
Discussion on "Gas Service" to be opened by Mr. W. M. Carr, Engineer and General Manager of the Stretford Gas Board, followed by Mr. G. P. Mitchell (Engineer and General Manager of the Blackburn Corporation Gas Department), and Mr. J. Boxhall James (Assistant Secretary of the Preston Gas Company). Discussion open to Members.

12.45 p.m. Adjournment for luncheon at the kind invitation of the Southport Corporation Gas Committee.

Afternoon Session.

2.30 p.m. Public Conference. Opening remarks by the President of the Conference.
Address on "Atmospheric Pollution in Relation to Health" by Mr. R. Veitch Clarke, B.Sc., Ch.B., D.P.H., M.A., M.B., Medical Officer of Health, Manchester.
Discussion to be opened by Councillor W. Melland, Chairman of the Smoke Abatement League.

4.30 p.m. Tea.

The showrooms of the Southport Corporation Gas Department, Cambridge Arcade, will be open for inspection.

Southern Association Visit to Exmouth.—By invitation of the Chairman and Directors of the Exmouth Gas Company, an excellent programme has been arranged for the visit on Friday, May 10, of the Southern Association of Gas Engineers and Managers. The morning will be devoted to an inspection of the gas-works under the guidance of the President (Mr. W. E. Dean) and his staff; and luncheon at the Manor Hall will be followed by a motor coach tour across Dartmoor, tea being taken at the Moorland Hotel, Haytor.

PRESIDENTIAL ADDRESS OF H. C. SMITH, M.Inst.C.E.

Eastern Counties Gas Managers' Association, May 1.

May I assure you that I deeply appreciate the honour you have accorded me by electing me as your President for the year 1929. A list of your Past-Presidents contains the names of men well-known and honoured in the gas industry—men who have set high standards both in their work as gas engineers and as Presidents of this Association. I cannot do more than endeavour to follow their example.

In the first place I should like to describe briefly some of the main items of reconstruction which have been carried out at Tottenham during the past few years. Though these are not perhaps of a novel nature, at the same time I hope that some points in connection with them will prove of sufficient interest to warrant their inclusion in this address.

The continued increase in the demand for gas has rendered necessary the carrying out of one of two alternatives:

(*a*) The erection of new carbonizing and ancillary plant, or

(*b*) the reconstruction and modification of existing plant.

The site occupied by the existing gas-works at Tottenham is very congested. The erection of additional carbonizing plant could only have been undertaken on a new site situated on the east of the London and North Eastern Railway. The policy adopted during the past few years, therefore, has been that of reconstructing and modifying existing plant.

Reconstruction of Vertical Retorts.

No new carbonizing plant has been erected at the Tottenham Works since the year 1916, when two benches of Woodall-Duckham vertical retorts, each nominally capable of producing 2½ million c.ft. per diem, were installed. These retorts were heated by means of producer gas generated in outside producers which were fitted with mechanically operated grates for the removal of ash. So far as the operation of the grates was concerned the producers functioned admirably, no clinker being formed and the inert matter being discharged in the form of a reddish ash containing a low percentage of combustible matter. The producers were designed to burn small breeze, but in practice it was found impossible to maintain satisfactory heating in the retort settings when using this grade of fuel.

Experiment showed that the most suitable fuel was from ½ in. to 1¼ in. The demand for coke of this size increased rapidly with the growing popularity of the domestic coke boiler, and this fact, coupled with the high percentage of fuel consumed by the outside producers (averaging 25 p.ct. by weight of the raw coal carbonized) rendered necessary some modification in the heating arrangements.

A very large proportion of the excessive fuel consumption was due to the distance the producer gas was carried before entering the retort settings, though the mains carrying this gas were carefully lagged. Some of this heat might have been saved by the installation of sensible heat recovery boilers in the producer gas stream, and a scheme to provide these was considered (but not adopted) when the first section of vertical retorts became due for resetting in 1928.

The vertical retort installation consisted of two benches each containing 28 retorts. The dimensions of the retorts were as follows:

Width across minor axis at mouthpiece	7 in.
,, ,, major ,, ,, ,, ...	6 ft. 1½ in.
Total length	27 ft.

It was found that 28 Woodall-Duckham vertical retorts each measuring 10 in. by 6 ft. 1½ in. by 27 ft. could be erected with very little alteration to the steelwork, together with four end producers (two being situated at each end of the bench) in the space occupied by the existing 28 retorts.

Messrs. Woodall-Duckham were prepared to guarantee that the fuel consumption when carbonizing South Yorkshire coal containing not more than 6 p.ct. of ash and 2 p.ct. of moisture should not exceed 15 p.ct.

It was decided to reconstruct the first bench on these lines in 1928, and the second bench in 1929.

Fig. 1 is a plan of one of these benches before the reconstruction—fig. 2 showing a plan after reconstruction.

These two plans are of interest as illustrating the economy effected in ground space occupied by vertical retorts within the last few years; the 28 retorts, including the four producers, now occupying the same area as was previously occupied by 28 retorts alone, this area being 1914 sq. ft.

When the reconstruction of the second bench is completed the nominal capacity of the vertical retort house will be increased from 4½ million c.ft. to 6½ million c.ft. per diem of gas having a calorific value of 500 B.Th.U.

Coke Screening Plant.

Two Norton coke screens were originally installed, screening into four sizes: 0 to ¾ in., ¾ in. to 1¼ in., 1¼ in. to 2 in., and over 2 in. The general arrangement of these screens and of the storage hoppers is shown in fig. 3.

With the development of the sales of graded coke it was found that the quantity of the smaller grades made—particularly of the size from ¾ in. to 1¼ in.—was insufficient to meet the demand. The screens needed extensive repairs, and an arrangement illustrated in fig. 4 was decided upon.

In this arrangement the whole of the coke is elevated by means of a rubber band conveyor to a central point from which it may be discharged on to one of two sets of Drakes' screens, either direct or through a four-roll coke breaker also manufactured by Messrs. Drakes. These screens are arranged to grade fuel into the following five sizes: 0 to ⅜ in., ⅜ in. to ¾ in., ¾ in. to 1¼ in., 1¼ in. to 2 in., and over 2 in.

This arrangement of coke screening plant has been found to work admirably, and with it sudden demands for the smaller grades can be met quickly by the use of the coke breaker.

THE PRESIDENT.

H. C. Smith, of Tottenham.

Mr. Smith received his training in gas engineering with the City of Birmingham Gas Department. He was appointed Works Superintendent at the Swan Village Works in 1912, and, with the exception of the war period (during which he served in the Royal Field Artillery), occupied this position until 1920, when he was appointed Works Superintendent at the Tottenham Works. He became Chief Engineer at Tottenham in 1922. He was elected an associate member of the Institution of Civil Engineers in 1925, and a full member in 1928. Mr. Smith is an Examiner in Gas Engineering to the Institution of Gas Engineers.

Domestic Coke Contracts.

Many efforts have been made to increase the sale of graded coke direct to consumers, one of the most effective of which we have found to be the introduction of a domestic coke contract scheme.

A printed circular letter is delivered to each consumer describing the advantages of gas coke and setting out the correct grade for use in various appliances. The letter also gives particulars of the reduced rates at which coke will be supplied under contract. Enclosed with the circular letter is a simple form of agreement which the consumer is asked to sign and

return if he wishes to take advantage of the contract scheme. The form of this agreement is as follows:

DOMESTIC COKE CONTRACT. No.

I agree to order the whole of my requirements of gas coke for the next 12 months from the Tottenham and District Gas Company on condition that I am allowed a rebate of 1s. 8d. per ton below the current price ruling on the day of delivery of each consignment ordered during that period.

Name.....

Address.....

Date..... .....

CONTRACT NO..... Date.....

Please supply.....cwts. of:

* Grade 1 for Industrial use.
* Grade 2 for Domestic use in Open Grates.
* Grade 3 for Coke Boilers and Anthracite Stoves.

Name.....

Address.....

.....

* Strike out grades not required.

This card may either be posted or handed in at any Showroom of the Company.

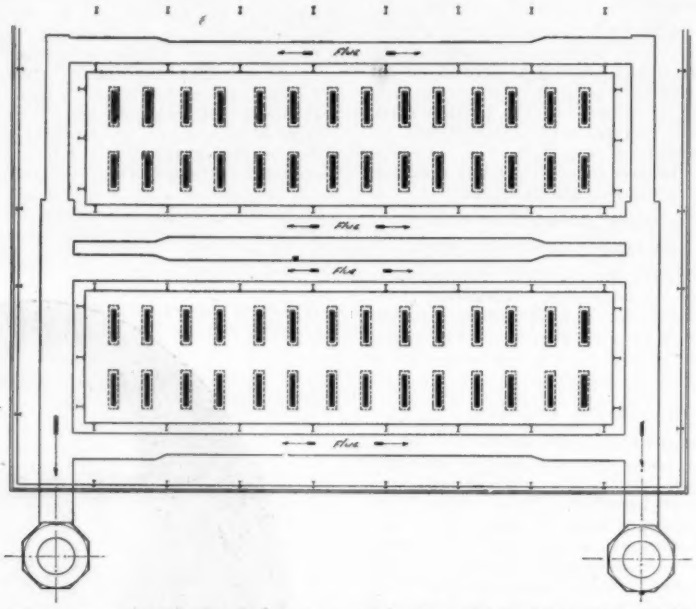


FIG. 1.—PLAN OF VERTICAL RETORT BENCHES BEFORE RECONSTRUCTION.

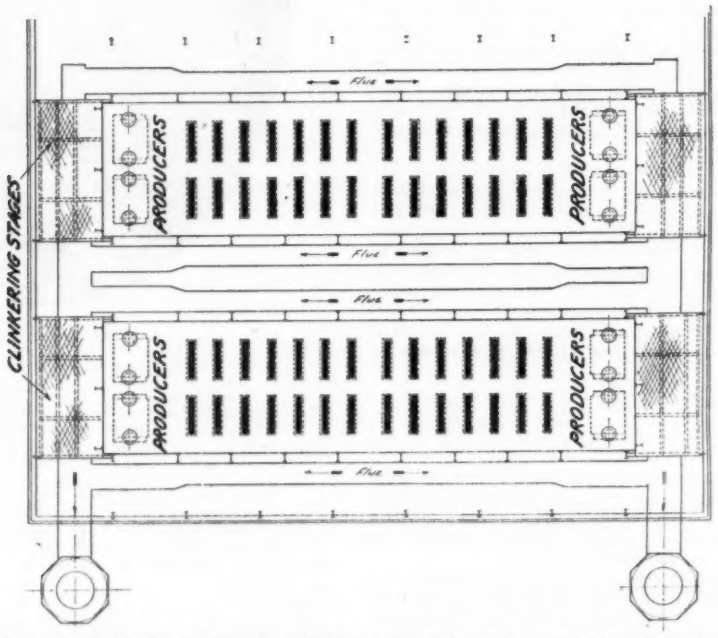


FIG. 2.—PLAN OF VERTICAL RETORT BENCHES AFTER RECONSTRUCTION.

A supply of order postcards in the form illustrated is sent to each consumer making a domestic coke contract. These cards are designed to make the ordering of coke as simple as possible, and it is found that they are very much appreciated.

The whole of the district is mapped out into areas for coke delivery, regular days being allotted for deliveries in each district, these deliveries always taking place on the same day of the week. This method has been found to have several advantages, and many consumers now give standing orders for definite quantities to be delivered periodically.

The scheme was inaugurated in 1927, since when 2632 contracts have been made. These are being added to at the average rate of 50 per month. The average annual consumption of coke per contract is found to be slightly over two tons.

The total surplus coke available for sale after satisfying the gas making requirements is from 40,000 to 50,000 tons per annum. We should thus require therefore to make 20,000 to 25,000 domestic contracts (say one contract per four consumers) to absorb the whole of this surplus. Whether we shall be successful in achieving this result it is too early to say; but with the growing popularity of the domestic coke boiler and the efficient coke consuming grates which are now on the market,

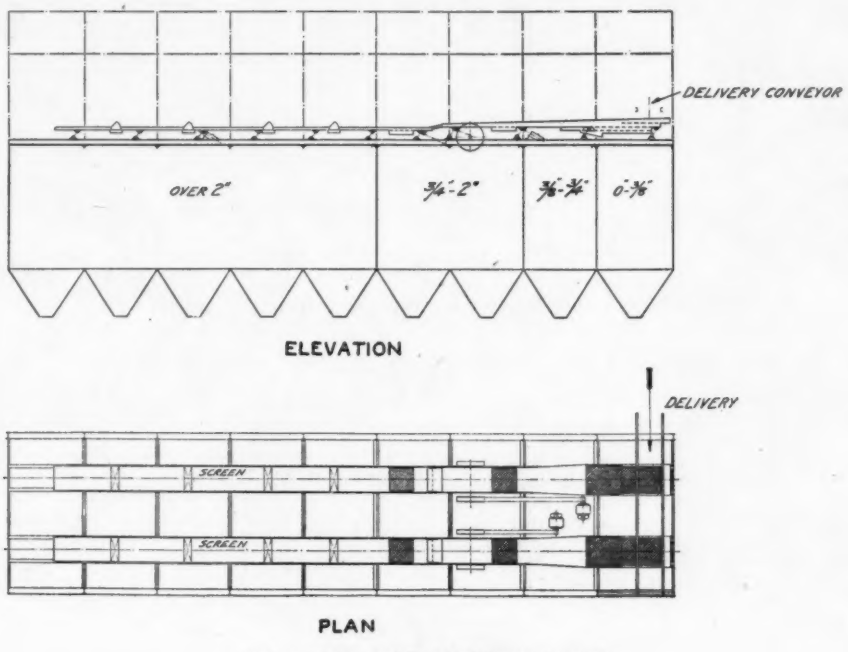


FIG. 3.—OLD COKE SCREENING PLANT.

we are hopeful that in time the whole of the surplus coke will be consumed for domestic use within our own district.

HORIZONTAL PLANT.

The most interesting alteration which has taken place in the horizontal plant during the past few years lies in the extensive use of 95 p.ct. silica segmental retorts.

No. 1 retort house contains two benches of nine beds per bench, each bed having eight retorts 22 in. by 16 in. by 20 ft. in length, the retorts being charged and discharged by a Fiddes-Aldridge stoking machine. These beds were re-set in 1924, one bench being set with moulded fireclay retorts and the other with segmental silica retorts. They were put to work in November, 1925. The retorts have worked 1253 days, and are still in excellent condition. The combustion chamber temperatures at which they have been worked averaged 1370° C. during the winter months and 1180° C. during the summer months when light charges were in use.

The costs of re-setting in silica were found to be 14 p.ct. more than those of setting in fireclay material, the actual figures being as follows:

The Costs Given are per Retort and are for Setting above the Producer Arch.

—	Fireclay Retorts.	Silica Retorts.
	£	£
Labour	24	26
Materials	12	15
Total	36	41

The makers of the silica material were not able to give any exact information as to the actual expansion of their material under working conditions, but were able to say that from their own laboratory experiments the expansion to be expected should

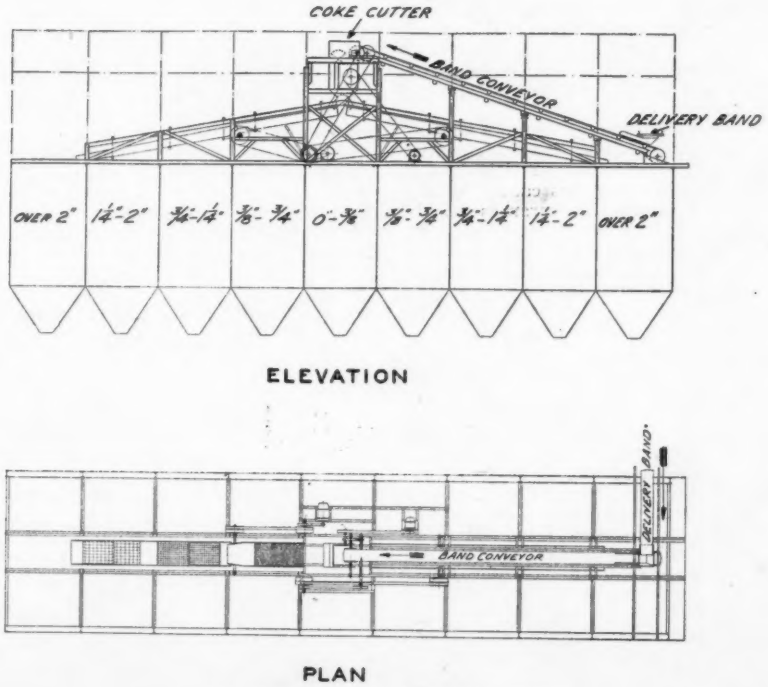


FIG. 4.—NEW COKE SCREENING PLANT.

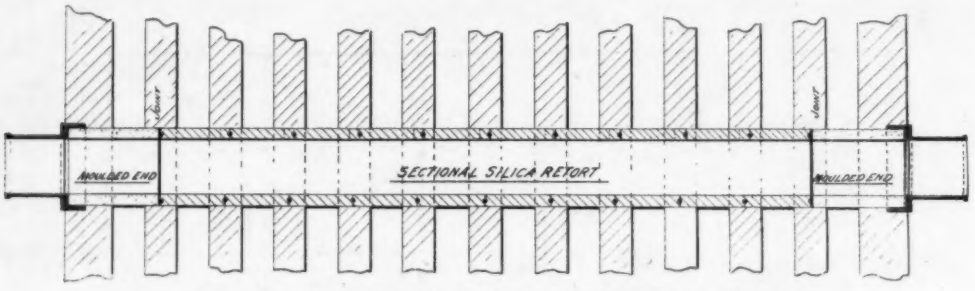


FIG. 5.—SILICA HORIZONTAL RETORT. LONGITUDINAL SECTION.

not exceed 1·25 p.ct. at the temperature of the combustion chamber.

Acting on this information the retorts were set as shown in fig. 5. It will be seen from this illustration that a moulded fireclay endpiece 2 ft. 2⅝ in. long was set at each end of the silica retort to which the mouthpiece socket casting was fixed. The silica segments were set as close together as possible, a space of 1⅛ in. being left for expansion at each end of the retort between the retort and the fireclay lengths, this space being filled with corrugated paper packing. The provision for expansion was made in this way rather than by spreading it equally between each longitudinal segment, so that in the event of the expansion not being fully taken up it would be an easy matter to fill in any gap left.

It was interesting to find that the actual expansion was not sufficient to fill the space left; in fact, so far as could be seen, the longitudinal expansion of the silica retort was negligible.

No. 2 retort house contains two benches of twelve beds, each bed having ten 22 in. by 16 in. by 20 ft. retorts charged and discharged by Drakes' stoking machines. The first of these benches required re-setting in 1925.

Though the silica retorts in No. 1 house had not yet been put to work, and no experience had been gained as to their behaviour—at the same time every confidence was felt in this material—and as the cost of re-setting in silica was not considerably more than in fireclay, it was decided to set six beds in 95 p.ct. silica of the same make as that used in No. 1 retort house, and the remaining six in 80 p.ct. moulded siliceous material. The same allowances for longitudinal expansion were made in the setting of the silica as had been made in No. 1 retort house.

The experience on the first bench in No. 2 retort house was the same as in No. 1 house. There was no noticeable longitudinal expansion.

The remaining bench in No. 2 retort house was re-set during the winter of 1926-27. The silica retorts in No. 1 retort house were in perfect condition, as were also the retorts in No. 2 house. It was decided on this occasion to re-set the whole of the bench of 120 retorts with silica material. The only difference made in the design was that this time no allowance was made for longitudinal expansion, the moulded fireclay ends being butted up close to the silica length.

This practice has been fully justified, no trouble whatever having been experienced through retorts being set in this manner. The average temperature at which the silica retorts in this house have been worked has been 1400° C. in the combustion chamber during the winter months and 1200° C. during the summer months.

In all 252 (95 p.ct.) silica retorts are now in use, the longest life to date (May 1, 1929) being 1253 days, and the shortest 525 days. The retorts are all in perfect shape, and beyond a certain amount of grooving in the bottom tiles caused by the discharging machines, are to all external appearances practically as good as when they were put to work.

No serious patching has been necessary, with the exception of one retort in No. 2 retort house in which a hole approximately 4 in. by 3 in. developed after only 900 days' working, probably due to a stray piece of iron.

I should add that the retorts have never been let down since starting to work, the reduced requirements during the summer months being met by longer carbonizing periods, lighter charges, and lower heats.

Unfortunately there has been no opportunity of testing the gas making results to be obtained from silica retorts as against fireclay, but it is confidently anticipated that the adoption of silica will be fully justified by increased life, apart from any question of the saving of fuel or increased thermal yield.

The quality of silica material has improved enormously during the past few years both as to composition and regularity of size and shape, and for this our thanks are due very largely to the Refractory Materials Joint Investigation Committee of the Institution of Gas Engineers under the Chairmanship for many years of Mr. A. E. Broadberry.

At the same time the use of silica for retort purposes needs very careful consideration, and I would recommend anyone contemplating its use to study the valuable paper, "Some Notes on Horizontal Settings with special reference to Silica Retorts," read by Mr. Stephen Hay in November, 1927 [see "JOURNAL" for Nov. 23, 1927, p. 538].

CARBURETTED WATER GAS PLANT EXTENSIONS.

The carburetted water gas plant at Tottenham consisted of five sets erected by Messrs. Humphreys & Glasgow, Ltd., on various dates since 1894. Many alterations had been made to the plant since it was originally erected, but in 1926 its capacity was as follows:

2 sets each 1 million c.ft. per diem of 550 B.Th.U. gas.
3 " " 1½ " " " " " " "
A total of 5½ " " " " " " "

Equivalent to 31,625 therms.

Two of the three larger sets were connected to a waste heat boiler, the connections being so arranged that by the removal of blank flanges the boiler could operate on either of the sets.

The remaining larger set and the two smaller sets were converted to the backrun process, the capacity of the remodelled sets being 1,400,000 c.ft. per diem, each of 500 B.Th.U. gas.

The total capacity of the plant is now 6,700,000 c.ft. per diem, 2½ million c.ft. of which may have a calorific value of 550 B.Th.U. per c.ft., and 4,200,000 c.ft. of which is limited to 500 B.Th.U. per c.ft. The total capacity in therms has been increased from 31,625 to 34,750 per diem—an increase of 9·9 p.ct., whereas the c.ft. output has been increased by 16·5 p.ct. This latter percentage is really the effective increase, as, though it was possible to make 550 calorific value gas on the three sets before conversion, this quality of gas was rarely required; and it is anticipated that when the reconstruction of the second bench of vertical retorts is completed, the calorific value of the carburetted water gas will be reduced considerably.

PURIFICATION PLANT—HORIZONTAL SECTION.

The purifiers dealing with the gas manufactured in the horizontal retort houses were considerably under the capacity required, and in the design of new purifiers the relative merits of concrete and cast iron were carefully considered.

Concrete purifiers were first erected at Tottenham in 1916, and though hair cracks appeared in the side walls and floors of the boxes soon after they were put to work, apart from the unsightly appearance caused by the weeping of cyanide and other liquor through these cracks, the purifiers were in excellent condition, and it was felt that the twelve years' experience of concrete purifiers was sufficiently good to warrant every consideration being given to this material.

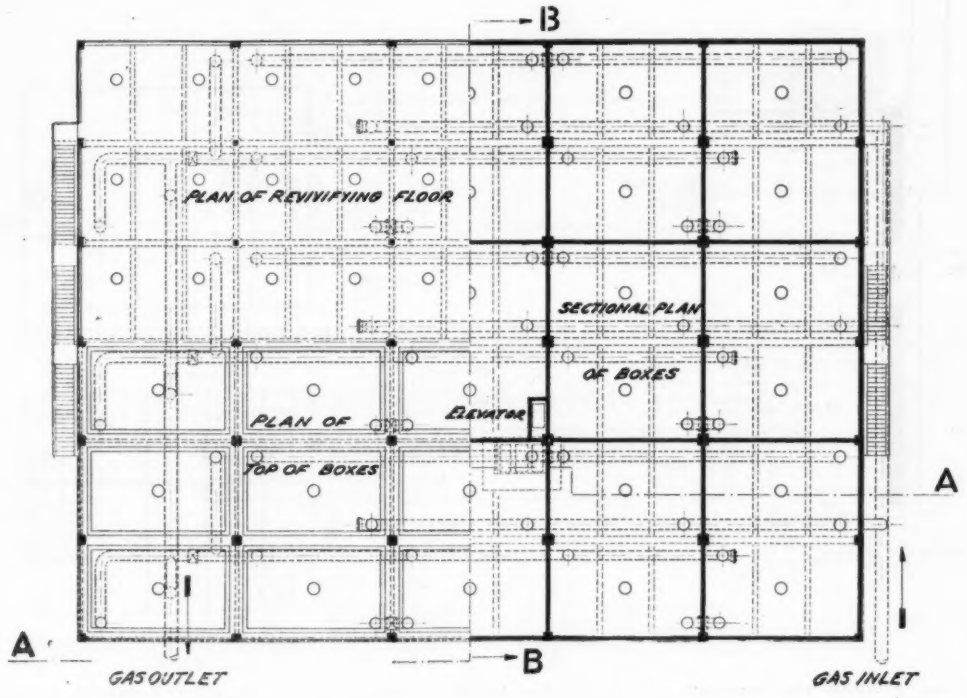
Designs and specifications were prepared for both cast-iron and concrete purifiers, the designs in each case providing for the boxes to be raised 15 ft. from the ground level and also for a revivifying floor over the boxes. The tenders for carrying out the work showed a saving of 26 p.ct. in favour of concrete, and this method was adopted.

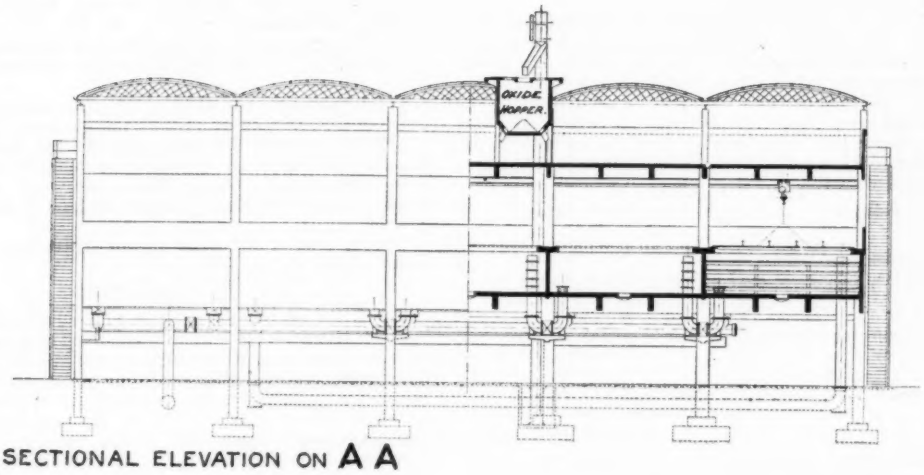
Fig. 6 illustrates the arrangement, which is of 15 boxes each 32 ft. by 25 ft. arranged in three sections of five boxes per section, the gas from the main inlet being divided into three streams. The gas inlets are carried to the top of the oxide, the outlets being taken from below the bottom layer. In order to control the quantity of gas entering each section an Arkon indicator has been installed on each stream.

The plant is designed to purify, nominally, 6 million c.ft. per diem, but this quantity can certainly be increased. Space has been left on the south side to allow of the erection of a fourth section of, nominally, 2 million c.ft. per diem capacity, should this be required in the future.

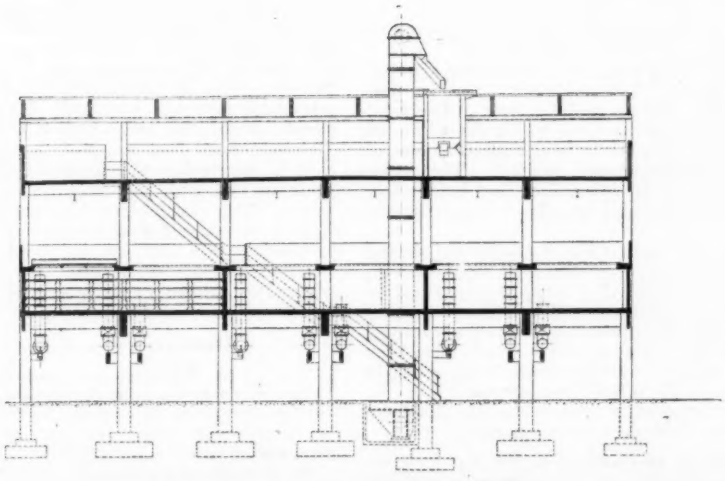
The boxes are emptied through manholes in the bottoms, and are filled by means of canvas chutes from the overhead revivifying floor, the oxide being raised from the ground floor to the revivifying floor by means of a belt elevator after first being passed through a Crone & Taylor disintegrator.

In order to minimize as far as possible the formation of cracks due to expansion, the concreting of the actual boxes was arranged in sections, the concreting of each section so arranged being carried out continuously. At the junction of these sections expansion joints of a form illustrated in fig. 7 were made. A layer of "Masticon" (a plastic material which will not solidify or change its nature at any temperature likely to be





SECTIONAL ELEVATION ON A A



SECTIONAL ELEVATION ON B B

FIG. 6.—GENERAL ARRANGEMENT OF REINFORCED CONCRETE PURIFIERS.

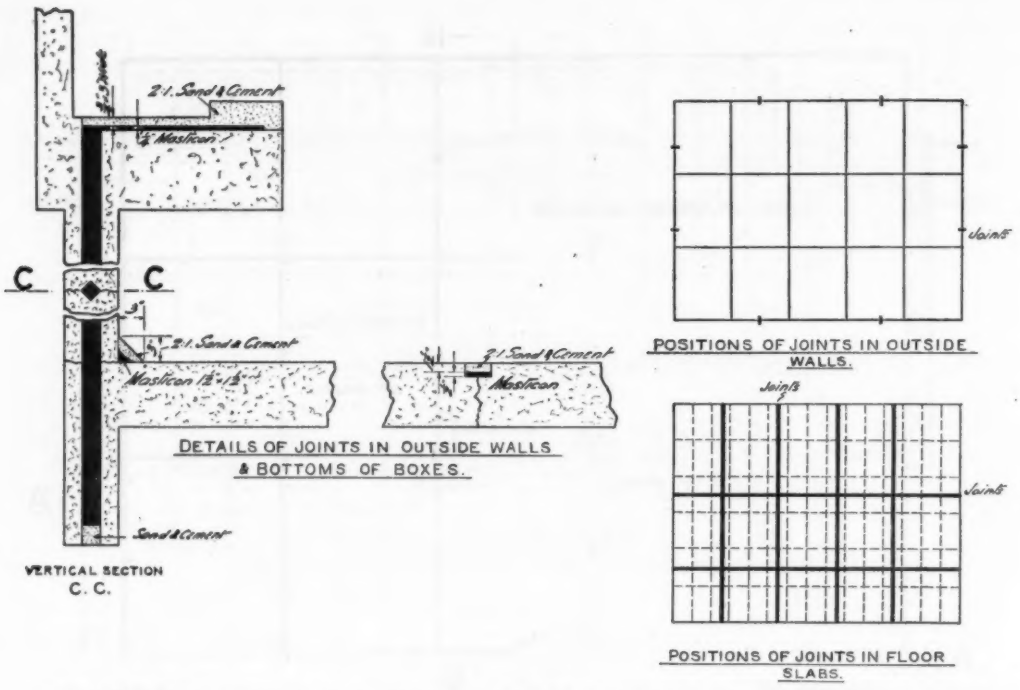


FIG. 7.—TYPE AND POSITION OF EXPANSION JOINTS IN REINFORCED CONCRETE PURIFIER BOXES.

met with) was inserted in each joint, so that should any expansion occur the " Masticon " would prevent any liquor from creeping to the outside of the boxes.

This method has not been found entirely satisfactorily as evidence of cracks has appeared, but these cracks have generally occurred at expansion joints, and it is proposed to cut out these joints as the boxes are taken off for refilling and to examine the condition of the " Masticon." It will be seen from fig. 7 that it is quite an easy matter to cut out the expansion joint and either to replace the " Masticon " or to fill in with some alternative material.

The mixes used were:

(1)	For foundations	6 of ¾ in. ballast 3 ,, sand 1 ,, cement
(2)	For columns and beams:	
	(*a*) From foundation level to top of boxes	2½ of ⅜ in. shingle 1½ ,, sand 1 ,, cement
	(*b*) Above top of boxes	4 of ¾ in. shingle 2 ,, sand 1 ,, cement
(3)	For boxes	2½ of ⅜ in. shingle 1½ ,, sand 1 ,, cement.

On completion of the concreting of the boxes, but before the " Masticon " was placed into position, each box was filled with water. A certain amount of weeping occurred in the sides and bottoms in isolated places, but this gradually dried off with the water still in the box. No weeping occurred at the expansion joints, however, until the boxes were put to work and gas passed through.

" Dri-Gas " and Naphthalene Washing Plant.

We have no doubt all followed with interest the development of the process for the partial drying of town gas as first installed at the Taunton Gas-Works in June, 1926. The total cessation of supply or drop in pressure due to the deposition of water, naphthalene, or rust in services is undoubtedly one of the greatest causes of loss of consumers' goodwill. The actual cost of clearing the services can be ascertained, but it is not so easy to estimate the indirect financial loss due to the irritation caused to consumers.

An important objection has been made to the partial drying process inasmuch as that while the consumer is supplied with partially dried gas, the test for calorific value as prescribed by the Gas Referees is made on gas measured in a saturated condition. This certainly gives the consumer a small advantage, and it is to be hoped that the representations which have been made will result in the necessary amendments being made in the method of measuring gas for official test purposes.

In this connection it is interesting to note that the National Fuel and Power Committee's Report recommends:

> That the Act should be amended to permit the Referees to prescribe a means of testing gas in the form in which it is sent out to consumers.

The advantages in favour of gas drying were considered to be such that it was decided to erect a plant at the Tottenham Works capable of treating 16 million c.ft. of gas per diem.

The plant takes the form of two Holmes rotary washer scrubbers arranged in parallel, the first half of each scrubber containing a 40 p.ct. calcium chloride solution for drying, and the second half water gas oil for the elimination of naphthalene.

A 3-million c.ft. per diem plant is also being installed at the Ponders End Works, so that all the gas made will be treated.

There is no need for me to describe the process in detail, as this has been done in an admirable manner by Mr. C. Harris in a paper read by him in November, 1927, on " The Partial Drying of Town's Gas " [see " Journal " for Nov. 23, 1927, p. 529].

The lay-out of the plant at the Tottenham Works is illustrated in fig. 8.

New Meters.

Fig. 8 also shows the position of a new meter house containing two Connersville station meters. These meters are similar in appearance to a Roots blower, but are designed so that slip is reduced to a negligible quantity. Each meter has a nominal capacity of 3 million c.ft. per diem and is guaranteed accurate to within *plus* or *minus* 1 p.ct. at all loads from 15 p.ct. of full load to 100 p.ct. overload. Below 15 p.ct. of full load it is necessary to correct the measurement recorded for slip. This correction is quite small, as will be seen from fig. 9, which gives the slip correction curve for each of these meters. The back pressure thrown at full load is not more than 0·75 in.

One small difficulty has been experienced with these meters due to the deposition of naphthalene on the impellers. The clearances between the impellers are so small that a very slight deposit will stop the meter entirely. To overcome this, approximately half a gallon of paraffin was introduced into each meter per diem through funnels fixed in the top casing above the impellers. This method was not found to be satisfactory, and an automatic feed has now been fixed which provides a regular supply of paraffin and which has overcome all the difficulties. This automatic feed is shown in fig. 10.

It is interesting to compare the ground space occupied by these meters with that required for the older type of station meter. The two Connersville meters are housed in buildings having an internal floor area of 512 sq. ft. Sufficient space is allowed in this area for the erection of a third 3-million c.ft. per diem meter in the future. A building to contain three drum meters of similar capacity erected at the Tottenham Works contains a floor area of 3250 sq. ft.

Maintenance of Consumers' Appliances.

Service to the consumer and the maintenance of his appliances is always a popular subject for discussion to-day. The methods of giving this service and of maintaining the appliances are many and varied, and depend to a large extent on local circumstances.

At Tottenham we consider that the first thing we should endeavour to do is to supply the consumer with gas of as constant a quality and composition as possible at a reasonably even pressure throughout the twenty-four hours. The maintenance

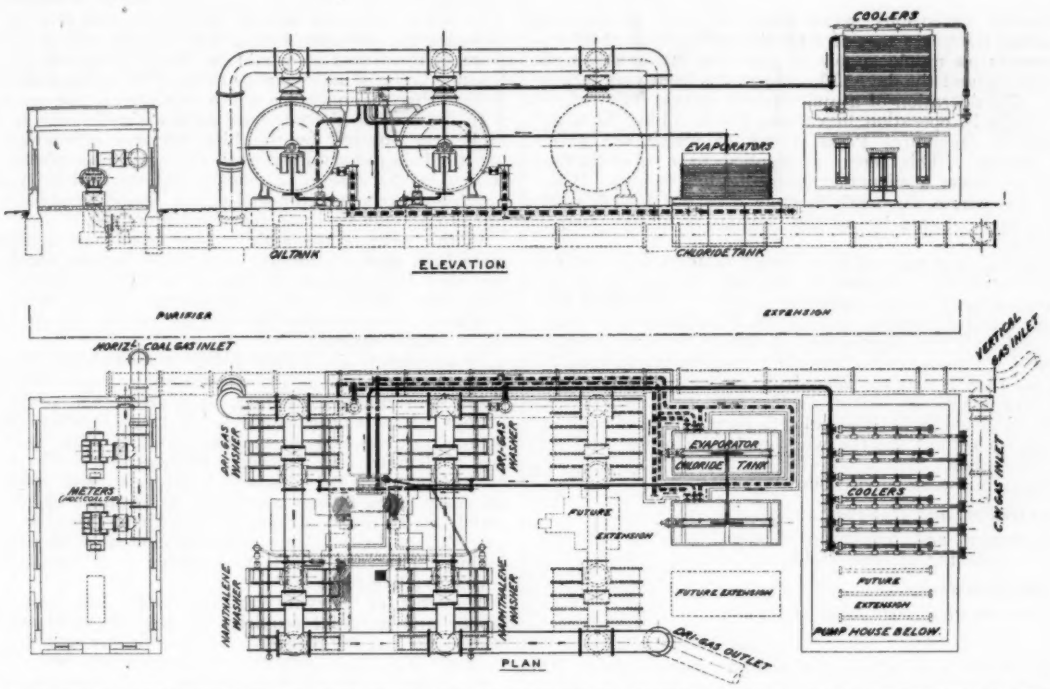


FIG. 8.—GENERAL ARRANGEMENT OF "DRI-GAS" AND NAPHTHALENE WASHING PLANT. ALSO CONNERSVILLE METERS.

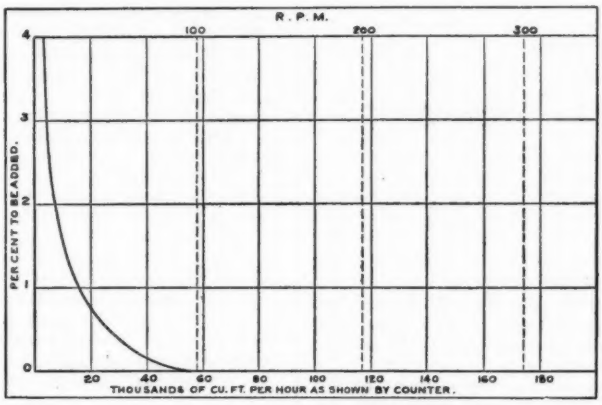


Fig. 9.—Correction Curve for Connersville Meters.

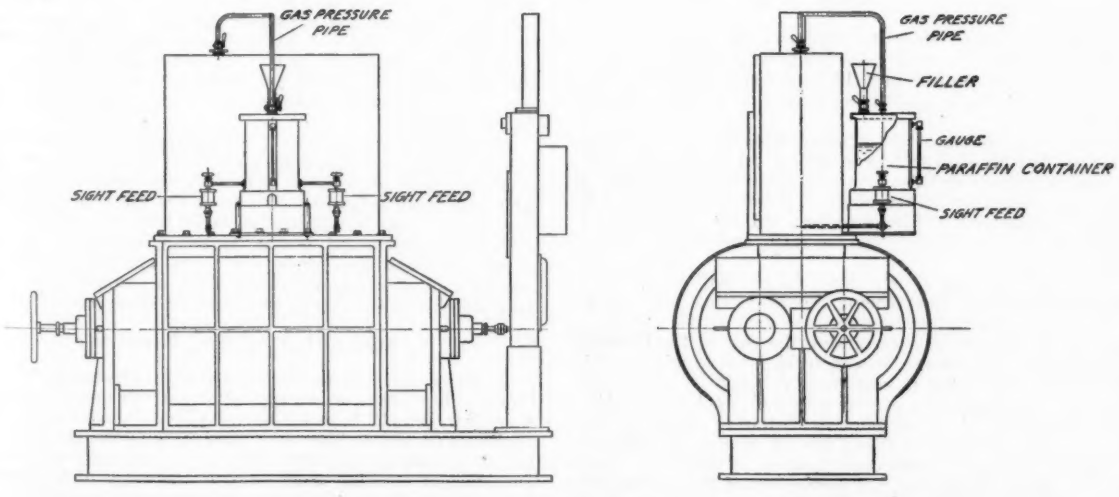


FIG. 10.—AUTOMATIC PARAFFIN FEED FOR CONNERSVILLE METERS.

of his appliances—though of great importance—is a secondary problem.

Considerable extensions were made in our distribution system during the years 1925-28 with the main object of affording consumers an ample supply of gas at a reasonably even pressure throughout the day. This object has been very largely achieved. Consideration of a maintenance system followed.

The systems in operation in various districts have been described in the Technical Press, many of which are called "free" systems. This term, as applied to a maintenance system, is of course a misnomer—someone has to pay. If the consumer for whom the work is done does not pay directly, then the cost is shared by all the consumers in the charges made for gas.

An examination of most of the "free" systems described led to the conclusion that the cost of applying them to my Company's consumers would be prohibitive, and it was decided that any scheme adopted must be very largely, if not wholly, self-supporting. While it was agreed that it should be made as easy as possible for consumers to have their appliances attended to, at the same time it was considered the proper policy for those consumers to pay direct for the services rendered.

In order to give effect to this policy a simple form of contract was drawn up setting out the work to be performed and the charges to be made. Briefly one visit per annum is to be made, and the following work carried out:

Cooker, Griller, and Hot-Plate.

Adjustment and regulation of oven burners, hot-plate burners, cleaning of stove inside and outside, testing.

Fires and Radiators.

Adjustment and regulation of burners.

Geysers.

Adjustment and regulation of gas and water supplies and testing.

Circulators.

Opening of circulator, scaling and cleaning, replacement of manhole cover and testing. Adjustment of gas burners. Painting.

Coppers.

Adjustment of burner and testing.

The charges made are as follows:

Apparatus.	Charge per Annum. s.	d.
Cooker	6	0
Griller	2	0
Hot-plate	2	0
Geyser	3	6
Circulator	10	0
Copper	3	6
Bath-heater	3	6
Fire	3	0
Radiator	3	0

As an alternative to the above charges the scheme provides for an "all-in" domestic charge of 10s. per annum to cover the above work in connection with all the appliances in any one domestic premises.

The above charges do not include the replacement of any necessary parts, such as tins, boiling burners, grill frets, gas fire radiants, geyser burners, geyser, circulator, and copper flues, or any parts of the original apparatus which owing to time and obsolescence become worn out or decayed. Any such fittings are replaced at cost price.

The maintenance of lighting fittings is also included in the "all-in" contract, the consumer being charged for any material used.

It was anticipated that the majority of consumers who adopted the scheme would take advantage of the "all-in" service at 10s. per annum, and this was found to be the case—over 77 p.ct. of the contracts made to date being of this description.

Before the adoption of the scheme attention to consumers' appliances had been given free of charge on application, but a visit was only made and the necessary attention given upon the receipt of a complaint to the effect that the appliance was not working satisfactorily. This attention did not necessitate the employment of a large maintenance staff, and the annual cost was quite small.

It was realized that a very much larger staff would be required to operate the new scheme should it prove popular, and in order to afford sufficient time to train such a staff and also to afford an opportunity of ascertaining the cost to the Company of carrying out the scheme, it was decided not to advertise this in the first instance, but to endeavour to apply it to those consumers who had asked for attention to their appliances. Upon receipt, therefore, of a complaint necessitating attention to an appliance, this attention is given free of charge as previously, but when the work has been carried out a circular letter is sent to the consumer giving him full particulars of the maintenance scheme and recommending him to enter into a maintenance contract with the Company. In this way about 250 contracts have been made since the scheme was put into operation in March, 1928. This is, of course, a small number, but as I have already explained we do not want the scheme to develop too quickly at first, as the necessary staff has to be trained.

In order to ensure that all new appliances sold are properly looked after, the same sum is added to the selling price of each piece of apparatus as would be charged for one year's maintenance under a maintenance contract; the purchaser being informed that the appliance will be maintained for one year.

In the case of hire-purchase sales a similar sum is added for each year covered by the hire-purchase agreement, the apparatus being maintained until the sale is completed. For instance in the case of a cooker sold on a three years' hire-purchase agreement, the sum of 18s. would be added to the sale price to provide for three years' maintenance.

In this manner the maintenance of all new appliances sold since July, 1928, numbering approximately 3000 pieces, has been provided for a minimum period of twelve months. Every endeavour will be made to encourage the consumers to enter into maintenance contracts when the period already covered for maintenance expires.

In addition to the scheme briefly described and which applies to apparatus which is the consumers' own property, arrangements were made in January, 1925, to examine periodically the fittings of all slot consumers. A large number of defective fittings are revealed by the examination. Any faulty fittings are condemned and replaced. Fittings are chiefly condemned by reason of faulty cups and balls, taps, and defective tube. In many cases fittings are found to be made of brazed tubes which are in a very dangerous condition. Needless to say the new fittings installed are manufactured of solid drawn virgin tubing. The intention is to examine each installation about once every five years.

The cost of carrying out this work last year, including labour and material required for replacements, amounted to £5206 7s. 11d., or 0·157d. per therm of gas sold through coin meters. This represents the average annual cost.

Since the inception of the scheme approximately 117,000 fittings have been examined, out of which 34,000 have been condemned and replaced.

This examination may appear costly to carry out, but I think that the percentage of fittings which it has been necessary to condemn—namely, 29 p.ct.—is ample justification for any expense which may be incurred.

For some years now, after carrying out the work of installing an appliance for a consumer it has been our practice to write him a circular letter asking whether the work has been done to his satisfaction or not. A stamped addressed postcard is enclosed with the letter which the consumer is asked to post to us. The form of the postcard is quite simple and is reproduced below:

Ref. .....

.....

Re..... 192

In reply to your letter I am

* Satisfied
* Not satisfied

with gas appliance, and with the manner in which the work has been carried out.

.....

* Please strike out unnecessary wording.

If the postcard is not returned within seven days from the date of posting, a suitable follow-up letter is sent; and if the postcard is then not returned a call is made by an inspector to ascertain whether the consumer has any complaint to make. Some 4500 letters are sent out each year; and replies are received without any trouble in 50 p.ct. of the cases, while 90 p.ct. of the replies received are to the effect that the consumer is satisfied. In any case of dissatisfaction a call is made immediately by an inspector.

Though this may appear a trifling matter, there is no doubt in my mind that it has done quite a lot towards improving the relations existing between the Company and its consumers. The reply postcards often contain orders for further appliances and also for coke in addition to the information asked for.

This reply postcard system is being applied to the maintenance scheme for consumers' own appliances. After the annual visit of the maintenance fitter, a suitable letter will be sent together with a stamped addressed reply postcard.

Simple Hire or Hire Purchase.

Opinions differ as to the comparative advantages of simple hire and hire purchase as applied to gas consuming appliances. The view is held in some quarters that it is better to let an appliance on simple hire, as it then remains the property of the gas undertaking, who can keep it in a proper state of repair and efficient working order; also in the event of the consumer giving notice to the undertaking to remove the appliance, it is possible to ascertain at once whether a rival form of apparatus is to be installed.

With regard to the first argument, arrangements can be

Table of Houses Erected and Appliances Fixed.

Year.	No. of Houses.	Lighting.	P.Ct.	Cookers.	P.Ct.	Fires.	P.Ct.	Circulators.	P.Ct.	Geysers.	P.Ct.	Coppers.	P.Ct.
1923 (6 months) .	248	58	23·38	248	100·00	86	34·67	7	0·02	34	13·70	202	81·45
1924	1152	205	17·79	937	81·33	720	62·59	23	1·99	252	21·87	747	64·83
1925	1327	428	32·17	1175	88·45	780	58·77	18	1·35	316	23·81	845	63·67
1926	1706	812	47·59	1650	96·71	656	38·45	17	0·99	316	18·52	899	52·69
1927	2109	778	36·88	2106	99·85	1520	72·07	12	0·56	352	16·68	1749	82·93
1928	1893	256	13·52	1949	102·95	1072	56·63	8	0·42	346	18·27	1417	74·85

made to maintain the appliance after it becomes the consumer's own property, as has been described already; and in the second place I believe that a consumer is very much less likely to discard apparatus which is his own property than rental apparatus which he can get rid of by giving due notice. The needs of different districts vary, and the policy which suits one will not necessarily suit another, but from our experience at Tottenham the hire purchasing of apparatus is growing in popularity with consumers each year, as the following table of hire purchase sales shows:

Year.	Hire-Purchase Sales.
	£
1921	661
1922	1,161
1923	5,515
1924	10,633
1925	12,640
1926	15,178
1927	16,438
1928	21,920
Total	£84,146

No doubt one factor which makes hire purchase popular is that any apparatus is sold by this method, including the more expensive types, whereas only the cheaper designs are rented.

The capital outlay necessary for the simple hire of gas appliances has prevented many undertakings—particularly the smaller ones—from developing on these lines. There is not, however, the same difficulty in the way of hire purchase. In this case the capital is returned at the latest in (say) three years.

The possibility of a consumer failing to complete his purchase is very small. At Tottenham, in transactions amounting to £84,146 covering the period 1921 to 1928, the amount representing failure to complete was only £1687 or 2 p.ct.

Lighting and Other Loads.

The day has long passed since lighting was the gas undertaking's only load, but gas consumed for lighting still constitutes a very large proportion of our total output.

An interesting opportunity arose recently in my Company's district of ascertaining on a fairly large scale what was the quantity of gas used for lighting as compared with the quantity used for cooking in houses of the artisan type. Two estates were developed by a local authority, the "A" estate consisting of houses in which gas was installed for lighting and cooking, and the "B" estate of houses in which gas was used for cooking only. In each estate gas was supplied through slot meters. Consumptions on these two estates were compared after twelve months, the average per consumer being:

"A" estate	24,000 c.ft.
"B" estate	15,000 ,,

The average consumption per slot consumer over the whole of the Company's district was 23,918 c.ft. per annum, so that it would appear fair to assume that the average consumption per slot consumer for lighting is approximately 9000 c.ft. per annum. This figure would no doubt be considerably higher in the case of ordinary consumers using gas for lighting.

A consumption of 9000 c.ft. per annum per consumer is a lot to lose, particularly as it represents a load which does not depend on climatic conditions (or only in a very small measure), but one which can easily be provided for. For instance, it does not cause the embarrassment which may result from a large gas fire load during a sudden spell of cold weather during the winter months. Sudden increases in output of from 30 to 40 p.ct. over the corresponding period of the previous year and extending over several days are not unknown in undertakings having large gas fire loads. During the cold spell in February this year there were undertakings who found it necessary to provide for from 50 to 75 p.ct. increases in their daily outputs.

The possibility of having to meet such demands during periods of maximum daily outputs has increased the percentage of spare carbonizing and purification plant necessary in order to ensure an uninterrupted supply of gas. This means additional capital lying idle during the remainder of the year, unless other loads can be developed to keep more plant in regular commission.

An interesting development of recent years has been the growing use of gas wash coppers. The following table shows the number of houses erected in my Company's district each year since 1923 and the number of appliances fixed in those houses, together with the percentages of appliances to houses. These percentages are a little misleading in the case of gas fires, as some houses have more than one fire, and occasionally houses have more than one cooker; but with these exceptions it may be taken that there is only one appliance of any particular kind per house.

Only appliances purchased or rented from the Company are included in this table, which represents appliances fixed to the order of the builders or first occupiers of the houses referred to. In all probability these numbers have since been increased.

In order to ascertain the increased consumption likely to be obtained by the use of gas coppers by consumers of the type referred to previously in estates "A" and "B," arrangements have been made to instal these appliances in a certain number of new houses at present in course of erection by a local authority. Unfortunately no figures are yet available in respect of these houses, but below is given the average annual consumptions of a number of consumers

(*a*) with standard slot installations and no gas copper; and
(*b*) with standard slot installations and, in addition, a gas copper.

The standard slot installations consist of a free gas cooker and up to four lighting fittings. The consumers selected are, so far as can be judged, what might be called "average" slot consumers:

(*a*) Average annual consumption of 12 consumers with no copper	25,400 c.ft.
(*b*) Average annual consumption of 24 consumers with coppers	34,600 ,,

It will be seen that the average annual consumption in the case of consumers (*b*) is 9200 c.ft. more than of consumers (*a*). The gas coppers in the premises in question have all been installed at the request of the consumers.

It would appear therefore that a wash copper will ensure a consumption of approximately 9000 c.ft. per annum (the equivalent of the lighting load) in premises occupied by slot consumers, provided the copper has been installed at the request of the consumer, who has either purchased the apparatus or is renting it. Whether a policy of supplying a free copper to slot consumers in addition to a free cooker could be justified is another matter dependent on the consumption likely to be obtained in these circumstances. No doubt some interesting information will be obtained on this point from the experience gained in connection with the installations of coppers in the local authority housing scheme to which reference has been made.

I think that the number of houses in which gas has been installed for lighting (as indicated in the table) will be considered satisfactory under present-day conditions; but when one considers that not many years ago we should have expected every new house to be so lighted wherever gas was available, it is obvious that means must be found to balance the reduction in the lighting load.

This is being done to quite a considerable extent through the use of gas coppers and gas fires. In the case of the latter I do suggest that a heavy winter load may be expensive (though I am sure that none of us would hesitate to fix a gas fire on that account). Such a load does stress the desirability of some scientifically designed system of charge as introduced at Halifax by Mr. W. B. McLusky or as described in the National Gas Council's Report of the Committee on Gas Charges.

On referring to the table again, it will be seen that the percentage of new houses in which geysers and hot water circulators have been fixed is very small indeed. How can their use be encouraged? These appliances are ideal for use in the summer months. The need for hot water is constant—not dependent (or only to a very small extent) on climatic conditions. Is it possible to supply gas at appreciably cheaper rates from (say) the beginning of April to the end of September so as to give the users of geysers and circulators the necessary encouragement? I suggest that for all increased consumption it is—the difficulty being to devise a scheme whereby the cheaper rate may be applied without loss.

Dealing first with the cost of manufacturing additional gas during the months mentioned, it is the practice now in many works to maintain at work throughout the year as much retort plant as possible, only letting down that on which repairs are to be executed; charges and temperatures on the remainder being reduced as may be required by the lessened output. It has been found that much more damage is caused to retort settings by letting them down completely than by keeping them

at work. It is not always found possible, however, to keep all the available plant at work, even with reduced charges. Assuming that the cost of repairs is not increased by keeping settings at work, then any additional gas manufactured during the period April to September over and above that required for the normal consumption can be manufactured for the net cost of coal and labour, *plus* a small charge for the extra wear and tear of charging machines and coal and coke handling plant. The chart illustrated in fig. 11 shows the actual daily output at Tottenham during the year 1927, expressed as a percentage of the total gas making capacity. The hatched space on the chart represents the gas which could have been made between April and September at the reduced cost already indicated after making due allowances for stand-by plant and plant let down for repair. This space represents a total consumption of 870 million c.ft. or 9050 c.ft. per consumer over these months, which is equivalent to 49 c.ft. per consumer per diem.

The difficulty is to apply a lower charge to this additional consumption without causing a loss, particularly in a company where there are considerable variations in consumers' consumptions. The only practical way of applying the scheme would appear to be to take a standard quarterly consumption for each of the two quarters and to charge at the reduced rate for all gas consumed over and above this standard consumption. In order to make the scheme attractive the standard consumption taken must not be too high—in fact, if it is much above the average consumption it is very unlikely that much advantage will be taken of it. On the other hand, if before the adoption of the scheme many consumers use considerable quantities of gas in excess of the average consumption, then the loss to the undertaking may be more than can be faced.

To increase the sales during the summer months, however, by the increased use of hot water apparatus in this manner is very attractive, and I make the suggestion in the hope that some company may have consumers whose actual consumption is very close to the average and who might possibly be able to give such a scheme a trial.

I should not like anyone to infer from what I have said with reference to the lighting load that I regard the loss of this as inevitable. I think those members who to-day have to meet keen electrical competition will agree with me that where electricity is available it is very difficult to instal gas for lighting in new houses of what, for want of a better description, may be called the "villa" type. Fortunately these new houses are generally occupied by consumers who appreciate the benefits to be enjoyed by the use of gas heating appliances. The annual consumption of these appliances should more than compensate for the lighting load lost. In many instances the occupiers of these houses appreciate the advantage of using gas for lighting in the kitchen, so that there is at least one light in the house when one of the frequent failures occurs which seem so necessary to the supply of electricity.

Many new houses of the artisan type are lighted by gas, these houses usually being erected by local authorities under their housing schemes. In this connection we should take advantage of every possible opportunity of protesting against the growing practice of certain local authorities (not necessarily those owning the electricity undertakings) of compelling their tenants to use electricity for lighting and of prohibiting them from having gas installed for this purpose. It seems monstrous that the occupiers of these houses should not be free to take advantage of the economy and other benefits enjoyed by the users of gas if they so wish.

STREET LIGHTING.

In spite of the prejudice against gas lighting on the part of some local authorities (probably engendered or fostered by the unfair boosting of electricity by politicians), the increase in the use of gas for street lighting is very satisfactory. Of a total of 7999 public street lamps in use in the area supplied by my Company, 7352 (91·91 p.ct.) are lighted by gas. A large number of six, eight, ten, or twelve mantle lamps are in use, but the majority have two-light fittings and No. 2 mantles. They are lighted and extinguished by means of Horstmann clockwork controllers, which function admirably, the percentage of failures being negligible. Every lamp is visited at lighting up and extinguishing times, and a failure is recorded if a lamp is not alight or extinguished when visited. The percentage of failures averages 0·047 p.ct. per operation.

The growth in the use of gas for street lighting may be seen from the following table, which gives the gas consumed by public lamps during the past four years:

Year.	Gas Consumed.
1925	122,544,600 c.ft.
1926	110,037,400 ,,
1927	131,316,000 ,,
1928	133,004,600 ,,

The decrease in consumption in 1926 was not due to any reduction in the number of street lamps in commission, but to the reduction in the hours of street lighting owing to the coal strike.

It is estimated that during the current year the consumption of gas by the 7352 lamps now in use will amount to 143,025,000 c.ft. The number in lighting at the end of 1928 was 6849, the increase in 1929 being mainly due to the number in use in the Waltham and Cheshunt districts, an amalgamation having taken place between the Waltham Company and the Tottenham Company as from Jan. 1, 1929.

It is interesting to note that the public lighting consumption for 1928 exceeded by more than 20 p.ct. the total output of the Waltham and Cheshunt Company for that year, which was 108,597,000 c.ft.

ARTERIAL ROAD LIGHTING.

The lighting of arterial roads has presented a serious problem to the local authorities in whose districts these roads have been constructed, and at the present time very few have been lighted.

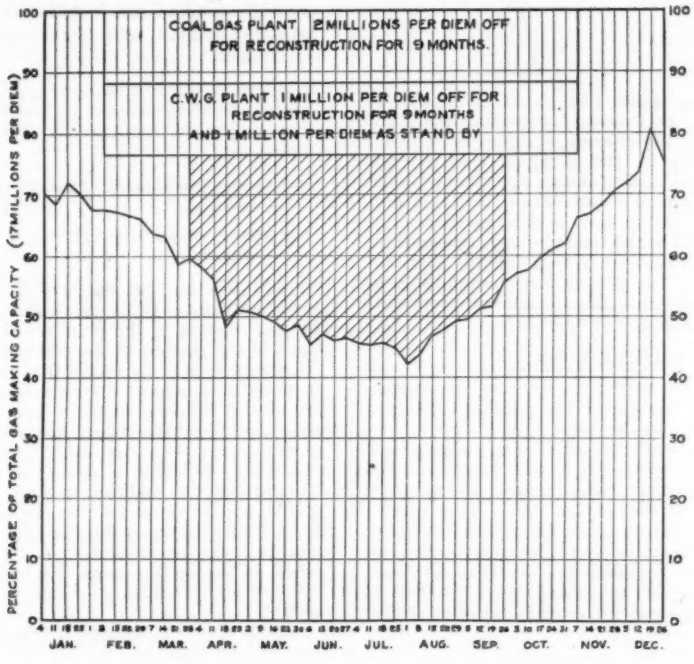


FIG. 11.—DAILY GAS OUTPUT 1927.

Showing quantity of gas available at reduced cost during summer months.

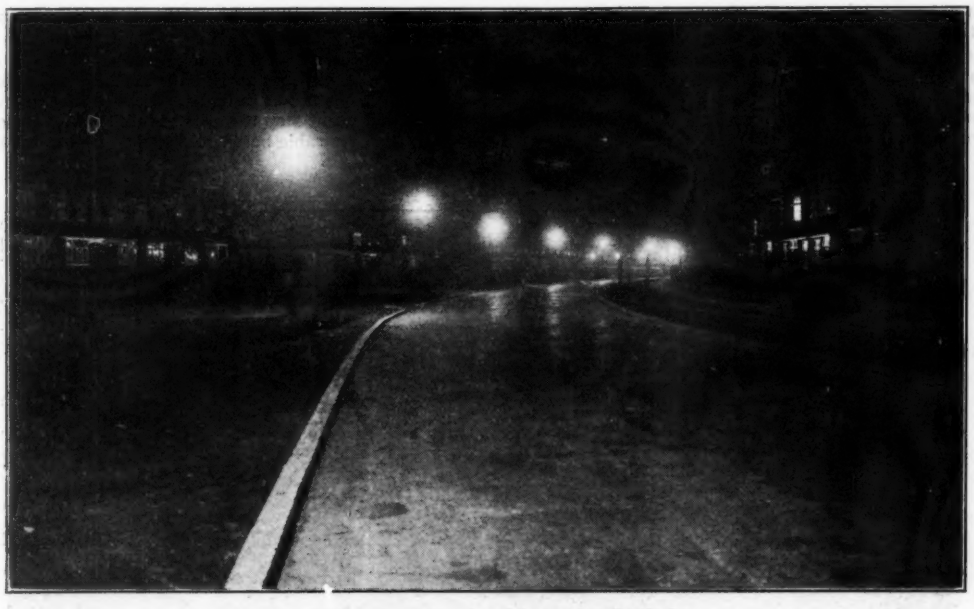


FIG. 12.—ARTERIAL ROAD LIGHTING.

The Tottenham Council recently decided to light the Tottenham portion of the New Cambridge Road, and after very prolonged consideration and testing decided to adopt gas lamps for this purpose. Forty-seven 600 C.P. Sugg's Rochester lamps are being erected at intervals of 100 ft. Fig. 12 illustrates the first thirty of these. The lamps are erected midway between the building lines, which are approximately 140 ft. apart. If, as is intended, a down road is constructed at some future date, and the present carriage way used for up traffic only, each carriage way will be well lighted by the central lamps.

Given fair competition gas cannot be beaten for street lighting either for economy or efficiency.

FACTORY LIGHTING.

The same statement is true with regard to factory lighting. Two factory gas lighting installations recently carried out by my Company may be of interest. Fig. 13 illustrates the premises occupied by a well-known firm manufacturing wireless components, and figs. 14 and 15, those of a large clothing manufacturing company. In the former there are 327 five-light Sugg's Belvedere lamps, 56 Belvedere lamps of four and two lights and 7 six-light Regent lamps. The latter premises are lighted by 183 Keith-Blackman high-pressure lamps of 750 C.P. and 42 high-pressure lamps by the same makers of 300 C.P.

I think it will be agreed that the quality and distribution of the lighting leaves very little to be desired.

As in the case of the arterial road, the lighting of these factories was only secured after very careful consideration by the occupiers, who tested samples of gas lighting against other methods. It is very satisfactory to be able to record that in the face of a strong initial prejudice in favour of other methods of lighting, our distribution staff were able to demonstrate to the occupiers of these factories that their premises could be most efficiently and economically lighted by means of gas.

The gas industry has been in existence for over one hundred years. A number of people outside the industry appear to imagine that it is already dead, or if not quite dead that it is suffering from senile decay and ought to be dead. We who are in the industry know that on the contrary there never was a time when it was more energetic and alive. Our manufacturing processes continue to show improvement in efficiency and economy; new uses are constantly being found for gas; and the manufacturers of gas consuming appliances are continually striving (and striving successfully) to produce apparatus which is not only more efficient in use but also more attractive in appearance.

It is our duty to see that the public are informed of the advantages we have to offer them. The prejudice to which I referred in connection with factory lighting was only born of lack of knowledge. The people concerned did not appreciate until it was demonstrated to them that gas appliances are continually improving and that gas can still compete favourably with any other form of heating and lighting, and is always likely to.

Prof. Burstall, M.Sc., M.A., Vice-Principal of the University

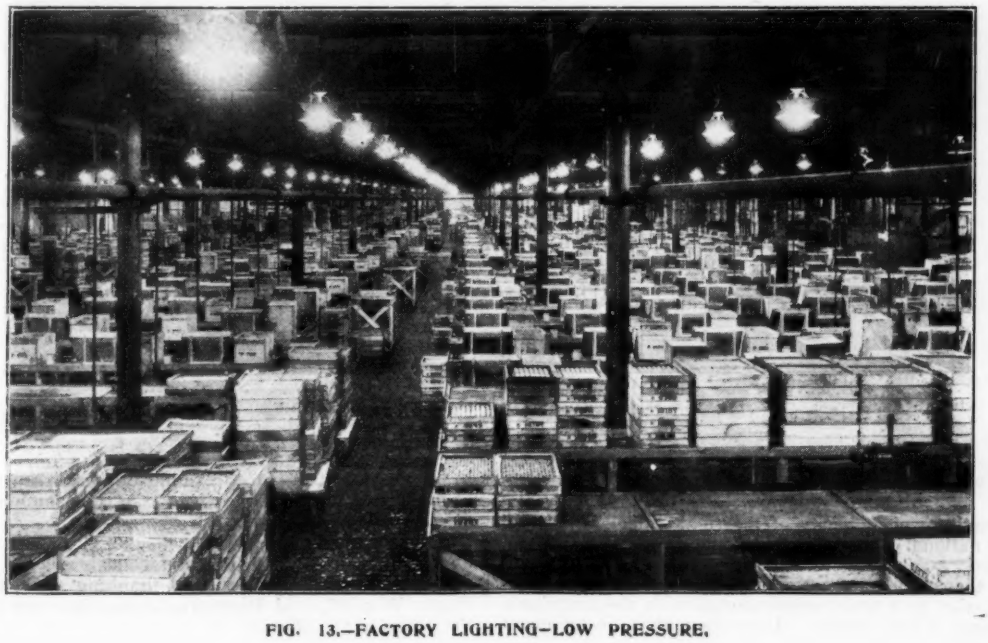


FIG. 13.—FACTORY LIGHTING—LOW PRESSURE.

of Birmingham, at the Joint Gas Conference held in connection with the British Industries Fair in February last said that:

> The gas industry was far too modest. The industry did not seem to have realized that the public constantly wanted to be told of the goods which were offered; and their particular industry was in a position to "lick creation." He need hardly say that this matter was very well understood by another section of public utility suppliers, who never failed to impress upon the public the value of their goods. A lot more publicity would be very much to the good of the community and of the gas industry. It was not too much to say that gas was the ideal fuel, and that it could never be beaten, no matter what changes science might introduce.

Any expenditure on publicity of the right kind is amply repaid. Our national advertising body, the British Commercial Gas Association, advertises as freely as its funds permit. Unfortunately these funds are not sufficient to enable the Association to advertise on a scale commensurate with the magnitude and importance of the industry. Let us hope that the day is not far distant when Prof. Burstall will be unable to complain of the industry's modesty.

I should not like to conclude without referring to our parent body, the Institution of Gas Engineers. The Institution, by deciding to amend its rules governing membership, has taken a most important step towards obtaining that close co-operation which is so desirable between the makers and the users of plant and appliances—a step which must prove of great benefit to the industry. The closer the co-operation that exists between all interests, the stronger will the industry be. Another important amendment provides that there shall be an examination qualification for membership. While heartily endorsing this, it is to be hoped that the forest of difficulties which lies in the path of many candidates who wish to take the examinations will be speedily removed.

In conclusion, I would again thank you for honouring me by electing me as your President for the year. I should also like to take this opportunity of thanking my Chairman, Mr. Henry Woodall, and Directors for enabling me to undertake the duties of the office.

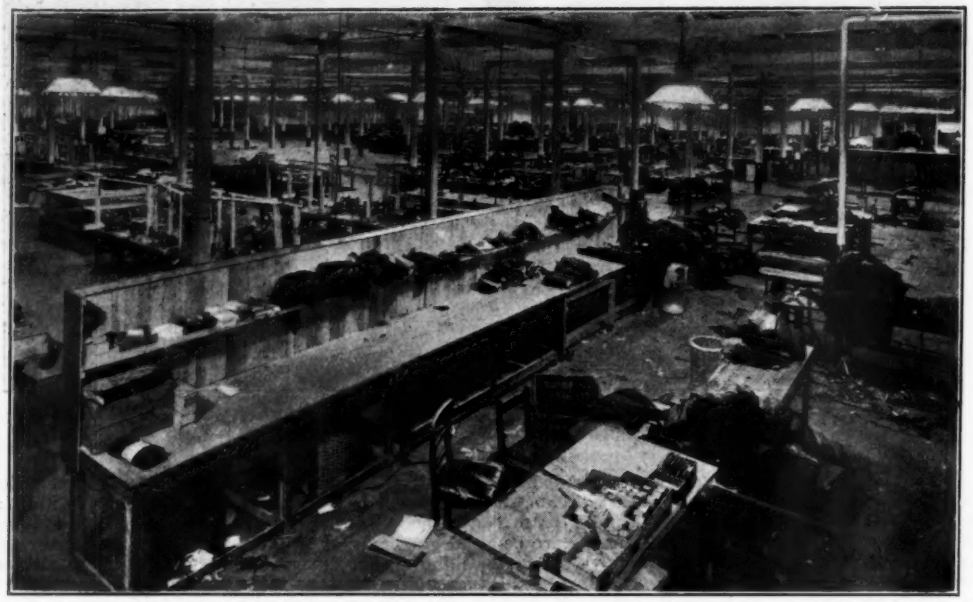


FIG. 14.—FACTORY LIGHTING—HIGH PRESSURE.

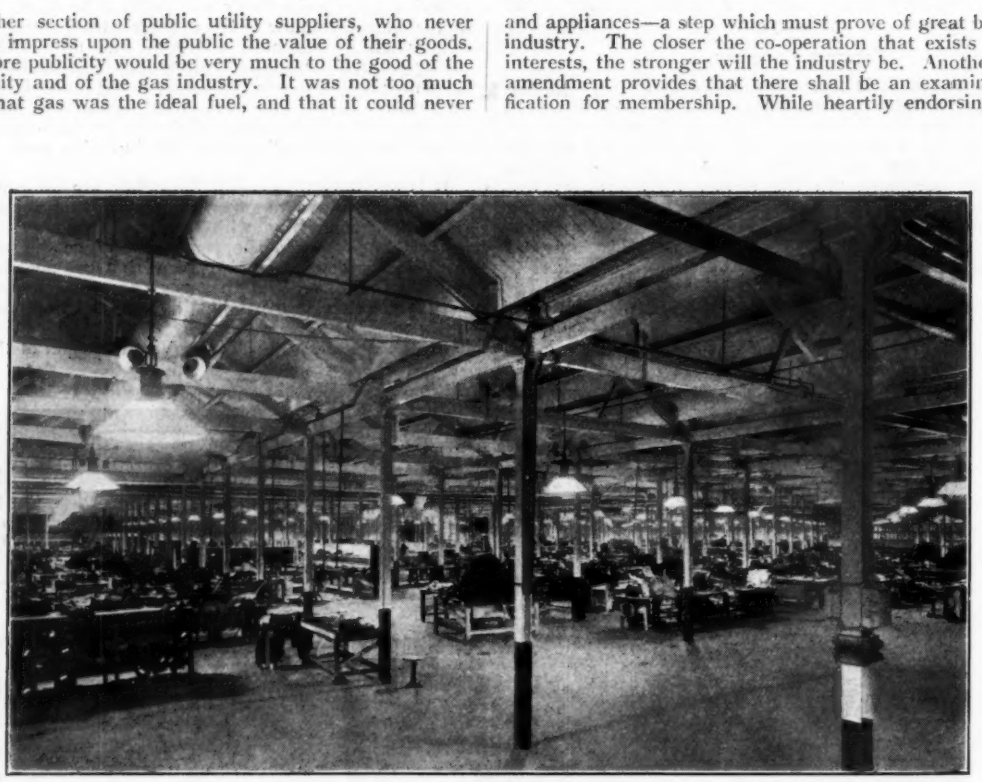


FIG. 15.—FACTORY LIGHTING—HIGH PRESSURE.

GENERAL NOTIFICATION OF THE GAS REFEREES.

Extensive Revision

A Re-Issue, dated April 15, 1929, of the General Notification of the Gas Referees, to take effect on May 1, has been made. It was not actually on sale until April 26. The price is 1s. 6d. through booksellers; or 1s. 10d. by post direct from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2.

The re-issue supersedes, as from May 1, the issue dated Dec. 15, 1926, which has been in force since Jan. 1, 1927. While a large part of the matter remains unchanged, there is extensive re-arrangement, and more sub-headings and a fuller table of contents have been provided, so that it should now be a simpler task to find a particular instruction or reference. The general re-arrangement of the body of the document—as distinct from the Appendices, in which little change has been made—makes it difficult to trace all the alterations, additions, and deletions which have been introduced in the present re-issue, but those which appear to be of most significance are believed to be included in the following review of the document.

The Table of Contents has about twice as many entries as heretofore. It is followed by the customary statement of the duties of the Gas Referees, and by a brief paragraph prescribing that the document shall be applicable to all gas undertakings to which their powers extend. The names of the three Referees are then given as having signed this prescription. In previous issues their names were given only towards the end of the document.

The General Notification is supplemental to a prescription for each gas undertaking in which the special conditions of testing, &c., applicable to that undertaking are set forth. Broadly speaking, the Special Prescription is a matter of only local concern, while the General Notification gives, as its title indicates, the conditions of testing, &c., to which all undertakings are subject, unless specially excepted. Only minor alterations have been made to the requirements as to the provision and equipment of official testing places; the innovations being chiefly in respect of the special provisions needed where recording calorimeters have been introduced. A one-tenth cubic foot per revolution meter may now be used in place of a one-twelfth unconditionally, whereas previously special approval was needed for it. There is a new foot-note to the effect that "Certain items of the prescribed testing apparatus have been devised by one or other of the present or former Gas Referees, but none of the Gas Referees has, or ever has had, any financial interest in the manufacture or sale in Great Britain of any gas-testing apparatus whatsoever."

The ultimate disposal of old note-books, copies of reports, &c., which are kept by the gas examiner under lock and key at the testing place, is the subject of a new paragraph. They are to be destroyed, not sooner than one clear year after completion, by the gas examiner or the Gas Referees. The permissible distribution of testings over the quarter, which previously was stated in terms such as "not more than one-half (of the total for the quarter) and not less than one-fifth" shall be made in any calendar month, and "at least one-tenth but not more than one-fifth" shall be made on Sundays, is now set out more precisely in a series of paragraphs headed to cover any possible number of testings in the quarter. Thus in cases where testings have to be made on seven days in each quarter, they shall be made on not less than two days in each calendar month; and not more than two may, though none need, be made on Sundays. Further, not more than one may, but none need, be made between midnight and six o'clock in the morning. The paragraph applicable to a particular case should be studied carefully by the gas manager and the gas examiner, as it is obvious that it may lead to some appreciable alteration in the sequence of, and intervals between, the gas examiner's visits to a testing place.

There is a considerable extension of the paragraphs relating to the representation of the gas undertakers at testings. The views of the Gas Referees as to the rights of the representative of the undertaking are stated in a section of which the sub-heading is "Guiding Principles in 'Representation.'" The first paragraph of this section is as follows: "The Gas Referees consider that the right of the undertakers to have a representative present on any occasion on which the gas examiner is carrying out his duties implies that such representative shall be in a position to observe that such duties are carried out in accordance with the provisions of the Gas Regulation Act and the Prescription of the Gas Referees made under them, provided that he does not thereby interfere with the gas examiner's work." Then follow indications of what the Gas Referees consider the representative is entitled to do and see, in regard both to non-recording and to recording observations. This section seems to be merely an offer of friendly advice to two parties, either of whom may regard the other's actions as antagonistic to him or his employers; and it is not couched in the language of an instruction to either.

There is no appreciable change in the instructions for testings of pressure and purity. The greatest novelty in the re-issue comes under the sub-heading of "Recording Calorimeters" in connection with the apparatus for testing for calorific value. Whereas previously the provision of recording calorimeters for official testings had been treated as only applicable in certain exceptional cases, it seems now to be foreshadowed that it may be required, before long, of all the larger gas undertakings. Moreover, the types of recording calorimeter acceptable to the Gas Referees are specified. These paragraphs are of such significance that they deserve quoting in full.

"Recording Calorimeters.

"The apparatus to be used for ascertaining the calorific value of the gas supplied by gas undertakers who have sold in the preceding year more than 100 million c.ft. of gas will be prescribed by the Gas Referees in the Special Prescription for each gas undertaking, and will include, as soon as it is prescribed in the Special Prescription, a calorimeter for the production of a continuous record of the calorific value of the gas supplied.

"As soon as it is prescribed in the Special Prescription, the recording calorimeter to be provided by gas undertakers who have sold more than 250 million c.ft. of gas in the preceding year shall be, for the present, one of the following—viz., the Boys recording calorimeter; the Fairweather recording calorimeter; or the Cambridge Scientific Instrument Company's Thomas recording calorimeter.

"As soon as it is prescribed in the Special Prescription, the recording calorimeter to be provided, as an alternative to the above types, by gas undertakers who have sold less than 250 million c.ft. of gas in the year, shall be, for the present, the 'Sigma' recording calorimeter, used in conjunction with a Boys non-recording calorimeter.

"Though the 'Sigma' recording calorimeter is inferential, the Gas Referees have satisfied themselves by very long trials that, when suitably enclosed to protect it from draughts, &c., the mean value for a period of not less than seven days ascertained from its record, after any necessary corrections have been made in respect of the results of verification tests with the Boys non-recording calorimeter, represents the true average calorific value of the gas supplied during such a period. It is hereby prescribed, however, that the record of the 'Sigma' recording calorimeter shall not be used for ascertaining the calorific value for any period of less than seven days."

In regard to testing places in which non-recording calorimeters continue in use, the Boys type, with the "box" in special cases, seems now to be the only permissible instrument for official testings. The paragraph in previous issues of the Notification under which the use of other types of water-flow calorimeter was sanctioned in exceptional cases does not appear in this re-issue. Modifications of the ordinary experimental meter are being introduced, which are stated to enable the correctness of its capacity to be determined by reference to an indicating point with an exactitude comparable with that attainable with the Boys bell meter. Either the latter meter or these modifications of the meter ordinarily provided render unnecessary the frequent repetition by the gas examiner of the tedious operation of proving the meter by means of the Harcourt meter-proving measure, though the latter must occasionally be used as the final standard of reference. In other respects the testing procedure with the Boys non-recording calorimeter is not varied to any appreciable extent.

New paragraphs give instructions for ascertaining the average calorific value for the quarter in testing places in which recording calorimeters are in use. The gas examiner is now required to send a copy of each of his reports to any rural district council concerned, in addition to the County Council or Quarter Sessions.

The document proper is followed by seventeen Appendices. The Appendix relating to "Measurement of Gas Volume" includes an account of the modifications of the ordinary experimental meter already mentioned. One of these is stated to have been devised by the staff of the South Metropolitan Gas Company; the other by Major C. G. Hyde, of the Gas Referees' Staff. By both the water in the sight-box is exposed to inlet meter-pressure, and its level is brought to an indicating point, which in the first-named modification is inverted, and in the last is upturned. A setting-gauge is provided for the latter, as in the case of the Boys bell meter. This Appendix also indicates the changes in testing procedure and in the calculations which have to be made when the meter-drum passes one-tenth instead of one-twelfth of a cubic foot at each revolution.

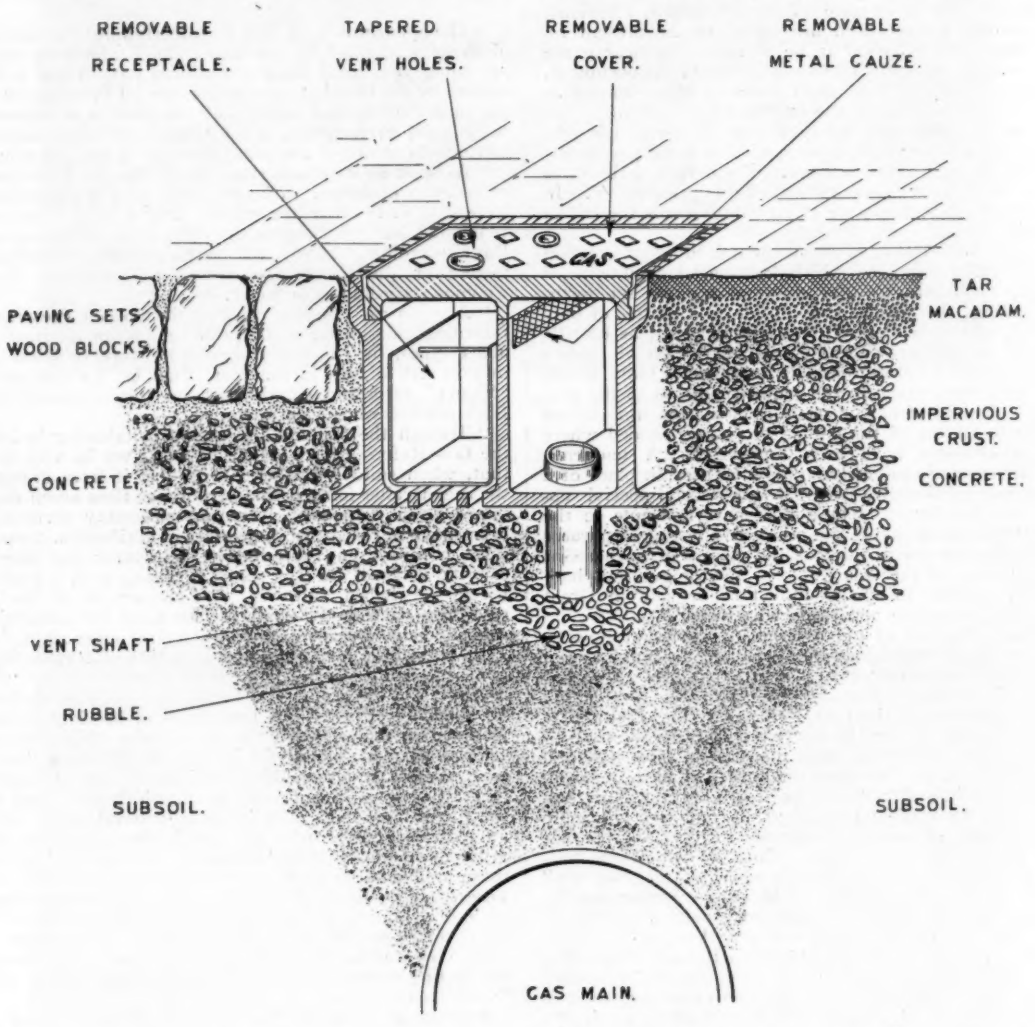
New Appendices give a specimen page of the gas examiner's record book, and of his form of report, for use in connection with recording calorimeters and pressure registers.

MINIMIZING GAS LEAKAGE DANGERS.

The Donkin "Sub-Soil" Vent Box.

Our readers will be interested in a new invention, for which a provisional patent has been obtained, having the threefold object of providing ventilation of the sub-soil to any depth beneath the impervious surface of roads and footpaths, of minimizing the possibility of dangerous explosive mixtures accumulating under road surfaces, and of serving as an indication of the position of gas mains. The ventilator is made adjustable as to level, and can be fixed to suit any depth of road material, and arranged so that the lid is flush with the final surface of the road.

Modern methods of road construction do not allow of natural ventilation of the sub-soil, with the result that any escaping coal gas, sewer gas, or other gas, tends to accumulate in cavities, such as underground cellars and the like. The invention, which is known as the Donkin "Sub-Soil" vent box, provides a vent by which escaping gas is conveyed harmlessly into the atmosphere above the road surface. Modern road surfaces are practically gas-tight, and there is always the possibility of gas pockets accumulating under these surfaces in most large towns, where thoroughfares have been widened during the last thirty years or so. In many cases old underground cellars of demolished property have been filled in with loose bricks, and these form localized accumulators of large quantities of any gas which may escape below the road surface. There is also the danger of escaped gas entering the cellars of dwellings.



The invention illustrated here comprises a metal vent pipe from which the escaping gas passes into a cast-iron surface box and then to atmosphere. The box may be rectangular, square, elliptical, or circular; and in the first three shapes it is provided with flanges both at the top and at the bottom. A central division plate divides the box into two compartments in such a way that there is a passage for gases from one compartment to the other at the top of the box; and this rectangular space may be covered by a copper gauze of suitable mesh. The top of the box is provided with a registering projection to ensure the lid being placed correctly in position, the lid being loose fitting. Tapering vent holes are formed in one half of the lid only, and are larger on the underside of the lid, to prevent the holes becoming choked with dirt or any other matter. A metal vent pipe, open at both ends, is fixed vertically at any required depth below the road surface, and its upper end is arranged to pass through an opening in the bottom of the surface box and on one side of the division plate. The vent pipe forms a sliding joint in the hole in the bottom of the surface box, so that the latter can be adjusted to suit the differences of the road surface levels. On the other side of the division plate, and in the other compartment of the box, there is a removable metal receptacle for the collection of dust, mud, or other foreign matter which may pass through the vent holes in the one half of the lid directly above it. This arrangement prevents the accumulation of any dirt or foreign matter in the vertical pipe. A series of slotted holes is provided in the bottom of the surface box under the dirt receptacle, in order that the metal container shall contain nothing but mud, and that any rain or surface water which may find its way through the ventilating holes will overflow from the metal container through the slotted holes.

When a circular surface box is employed, it is in the form of a hollow cylinder, and no division plate is provided. The lower portion of the box is flanged externally and internally. The top of the vertical vent pipe terminates at the underside of the internal flanges, and semi-circular holes are cut in the top of the vent pipe to allow any gases to pass from the outside to the inside of the pipe. Vent holes are also provided in the lower portion of the cylinder. A dirt receptacle is provided, of smaller diameter than the cylinder and resting on four lugs in the upper portion of the box immediately above the vent pipe. The escaping gases have a free passage from the vent pipe to an annular space between the dirt receptacle and the cylinder, and thence through the vent holes in the circular lid to the atmosphere.

The inventors contend that a feeling of confidence would be given to the general public by the knowledge that the vent box had been adopted; and the risk of explosion from sewers, Post Office boxes, and electrical underground chambers minimized.

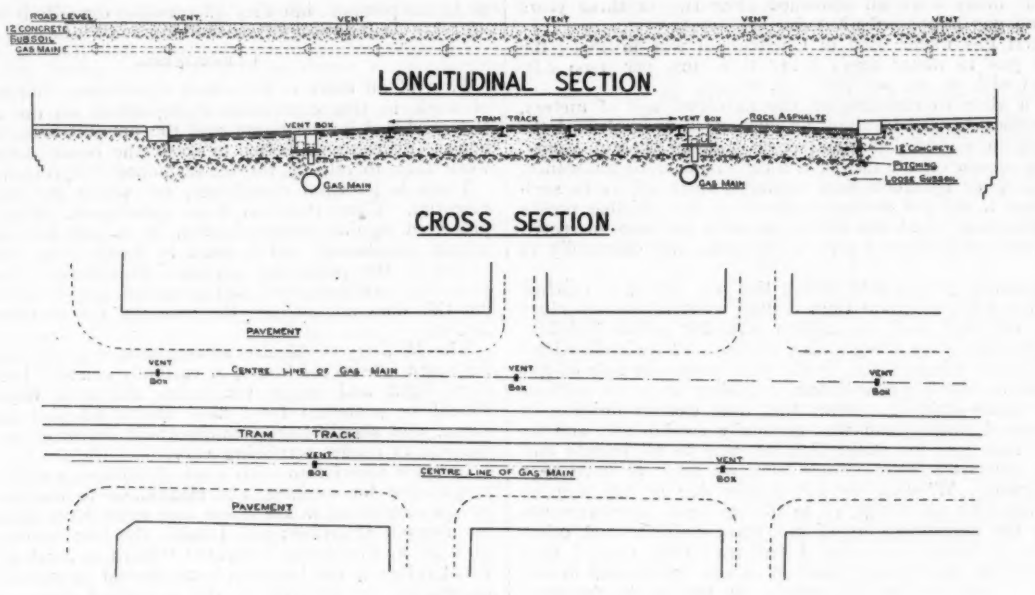
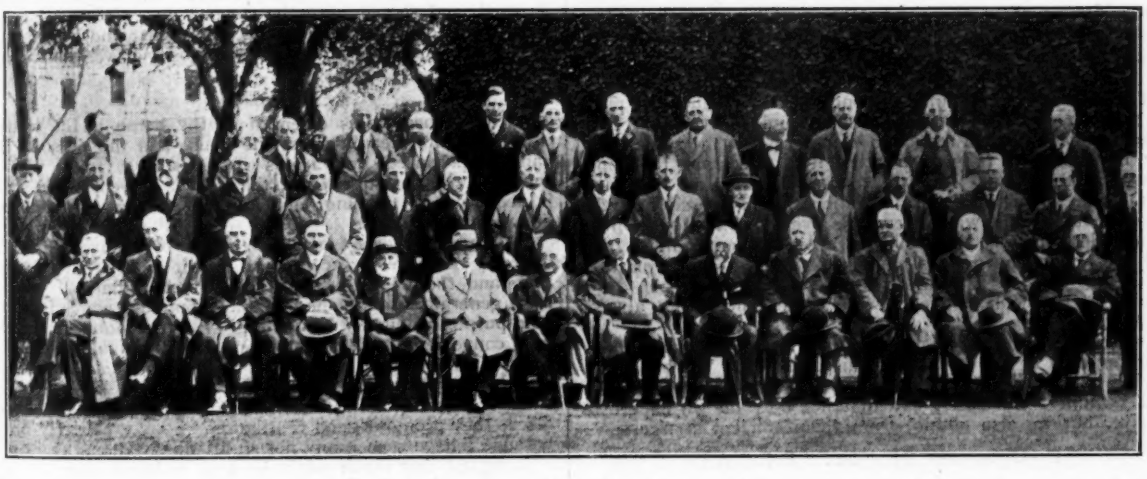


DIAGRAM SHOWING THE DISPOSITION OF THE DONKIN "SUB-SOIL" VENT BOX.

BRITISH COMMERCIAL GAS ASSOCIATION.

Midland District Conference at Cheltenham.



A Conference organized by the British Commercial Gas Association took place in Cheltenham last Thursday. The business part of the conference was held in the Board Room of the premises of the Cheltenham Gas Light and Coke Company; luncheon was taken at the Queen's Hotel; and in the afternoon a public lecture was given in the Town Hall. Mr. A. H. WYATT (a Director of the Cheltenham Gas Light and Coke Company) presided, and was supported by Mr. W. M. Mason (General Manager of the British Commercial Gas Association) and the principal speakers.

The subject considered at the conference was "Gas in relation to Public Health;" the principal speakers being Dr. R. Bute MacFie, O.B.E., M.B., B.Ch., a well-known Cheltenham practitioner, who spoke on "Health in the Home;" Mr. C. W. Welford, A.S.A.A. (Commercial Manager of the Cheltenham Gas Company), whose address was entitled "Every Town a Health Resort;" and Dr. C. W. Saleeby, F.R.S. (Edin.), Chairman of the Sunlight League, who lectured on "Sunlight and Health."

The CHAIRMAN, in opening the conference, said the subject seemed very appropriate to discuss in such a well-known health resort as Cheltenham, and it should help towards a solution of the difficulties which have to be overcome in many of our large industrial cities and towns.

STATISTICS OF THE CHELTENHAM GAS COMPANY.

Cheltenham was among the first half-dozen or so Companies in England to possess statutory powers. The Gas Light and Coke Company appears to have been the first Company incorporated by Royal Charter, in 1812, under an Act of Parliament passed in 1810. It was not long afterwards that two notable inland spas—namely, Bath and Cheltenham—though still in the reign of King George III., had the foresight to see that it was essential for health resorts, so far as practicable, to dispense with the smoke nuisance, and convert what coal they could into gas for industrial and household purposes. I am not unmindful of the fact that there is at all events one Company in the Midland District of this Association which obtained statutory powers as far back as 1818—namely, Kidderminster, which, I believe, is represented by a delegate at this meeting to-day. Bath obtained statutory powers in 1818, followed by Cheltenham in 1819, though, as a matter of fact, Cheltenham commenced the manufacture and supply of gas a year before—namely, in 1818—working under a Deed of Association; and it is on record that they entered into their first contract for the purchase of coal—namely, 2000 tons—in September, 1818, at a cost of 24s. per ton delivered at the works. It may seem at first sight that this was rather a heavy price to pay in those days, when wages were low, but I believe that a large portion of the cost was attributable to the haulage and transhipment charges from the colliery, partly by road and partly by water, as there was no railway available at that time.

Gas was first introduced for street lighting in Cheltenham in 1818, when there were 84 gas lamps and 262 oil lamps in

use. The latter were all abolished some two or three years later, and gas lamps substituted.

The first gas meter used in Cheltenham was in 1836; the price of gas to meter users being then 10s. per 1000 c.ft. compared with 3s. 5d. per 1000 c.ft. to-day.

With a view to encouraging the universal use of meters, the Directors decided to allow all customers who adopted the meter system a special discount of 30 p.ct. off their accounts. This may appear on the face of it a rather generous allowance, but by hook or by crook they managed their affairs in such a way that it did not detrimentally affect the divisible profits of the Company, and the dividends seem to have increased shortly afterwards from 8 p.ct. to 8½ p.ct., and eventually to 10 p.ct.

The quantity of gas sold during the year 1876 had reached 168 million c.ft., or more than double what it was in 1862; but this included over 20 million c.ft. for public lighting. At the time when the Corporation commenced their electricity undertaking in Cheltenham, in the year 1895, our sale of gas amounted to about 338 millions, including over 28 millions used for street lighting. After that date electric lighting in the streets of Cheltenham was gradually established, and by the year 1922 gas for street lighting was to all intents and purposes dispensed with. Since then we seem to have shot ahead rapidly. Whether or not it was due in any way to competition with electricity, or to the immense improvements made by the manufacturers of gas fires, cookers, and other appliances, I cannot say; but I feel sure that a good deal of it is due to efficient management at our works and in our distribution and service departments, as well as to the good services rendered by the "B.C.G.A." As an example of the great strides we have made since 1920, I may state that the amount of gas sold has risen from 401,636,000 c.ft. in that year to over 545 million c.ft. in 1928—an increase of about 35 p.ct.

In addition to the increases in our sales of gas, we have also done remarkably well in respect of the sales of gas appliances and fittings. In 1923 our sales from this source amounted to the moderate sum of £5830. Since then we have improved on this far beyond what we anticipated, and last year our sales of appliances amounted to £13,551, representing an average increase in sales of over £1500 a year. These figures show the remarkable confidence of the public in the use of gas.

POLICY OF THE BOARD.

The policy of our Board is to endeavour to reduce the price of gas whenever opportunity occurs; and for the last four years we have made a reduction each year. At the same time, my Directors are fully aware that it is necessary to supply gas of good quality. It is, of course, desirable, in supplying gas, to do so without more variation than is possible in the calorific value, otherwise it tends to give the consumers a little trouble in adjusting their burners. At the same time, I do not lay any blame on gas engineers, owing to the variation in the gas tests, as I believe it to be mostly attributable to the quality of the coal supplied by the colliery not being always constant.

It requires experienced men to make good gas; and it also requires men of similar skill to dispose of it. We believe in paying our workers an adequate wage for adequate service; and I think I can safely say that not only do we expect to receive, but we also obtain, from them efficient service.

CO-OPERATION WITH THE "B.C.G.A."

During the period of the existence of the "B.C.G.A.," which I believe is now over seventeen years old, we have found it of inestimable value to belong to this Association. They have always been ready to give us every assistance; and the good work of the Association should be supported by every undertaking in the country, large as well as small.

ANTIQUATED LEGISLATION.

There is one other subject, to which I should like to refer, which affects our industry as a whole—the antiquated legislation under which we all suffer. The gas industry, which has now been in progress for a period of nearly 120 years, is still governed by Acts of Parliament passed more than eighty years ago; and having regard to the very valuable commodity which we supply to the public—to say nothing of the immense amount of coal which the collieries in the Kingdom are able to dispose of to gas undertakings, the enormous amount of money invested, and the quantity of labour employed—I think you will agree that it is high time that legislation should be brought up to date by whatever Government may be in power.

HEALTH IN THE HOME.

By DR. R. BUTE MACFIE, O.B.E., M.B., B.Ch.

I have been asked to talk on "Health in the Home;" and I think I can tackle the subject best under three headings, which overlap one another. I will deal with them separately, as far as possible, but they all combine towards health. They are: (1) Cleanliness; (2) ventilation; and (3) heating.

CLEANLINESS.

First of all there is household cleanliness; and the amount of work in this connection is dependent on the amount of dirt produced in the house and the amount brought into the house. It is much better to keep the house clean by daily work than to rely on the old-fashioned "Spring-cleaning."

There is personal cleanliness, for which hot water is the essential. Then there is food cleanliness. Food must be protected against contamination in a suitable larder with proper ventilation, and it must be handled by one who has exercised the necessary personal cleanliness. Many foods nowadays are preserved and protected before we buy them; but this does not exclude the necessity for cleanliness in the larder.

The Ministry of Health advises that a larder should be on the north side of the house, or carefully shielded from the sun. Good light and ample ventilation are most important. It should be protected from flies, should be cool and yet not damp, and should have non-absorbent surfaces on walls and shelves, to render scrubbing easy.

In close association with food cleanliness are cleanliness of preparation for cooking, and cleanliness in the cooking. To ensure cleanliness in the home, one must have suitable means for disposal of refuse; and I think the best advice is that of Mrs. M. A. Cloudesley Brereton: "Burn as much as possible." What refuse is not burnt at home should be stored in covered receptacles for removal to the municipal destructor. This removal of small quantities reduces unhealthy decomposition and the danger of contamination.

VENTILATION.

"We must have abundant ventilation. It is not the exposed postman who dies of tuberculosis, but the coddled clerk." So says Dr. Saleeby. This applies not only to tuberculosis and coddled clerks, but to any infection, and to any person who lives in badly ventilated rooms. In the home we have at hand means for easy ventilation—windows, doors, and chimneys. Windows and doors can only be utilized as ventilators when climatic conditions permit. Chimneys can always be used, and should never be stopped up. Chimneys are the best ventilators in British homes at present; and if houses are built without chimneys, some other form of ventilation must be provided.

HEATING.

Adequate heating is essential in the home. Hot water is a necessity for cleanliness of the house and the person. This can be produced by various methods, but from whatever source the heat is developed, there must be ventilation. Heat is necessary for cooking; and again there must be cleanliness and ventilation.

Heating the house may be achieved by many means: The ordinary coal fire is very cheerful, but it is wasteful as regards fuel, and there is not, as a rule, much radiation. Coke is most generally used in the home to supply hot water for household purposes and central heating. Electric radiators are clean and convenient. Central heating is a popular present-day form of warming a house; but I think special ventilation is a necessity with this type of heating. Gas is a clean and efficient method of heating; and when gas fires are properly fitted, they promote good ventilation. I say "properly fitted" because I have seen many not so fitted.

I suggest that much might be done in instructing the public as to the value of efficient ventilation, and I think that those who are engaged in the work of selling and fitting modern appliances for the production of heat should be more thorough in their care to ensure proper ventilation.

EVERY TOWN A HEALTH RESORT.

By C. W. WELFORD, A.S.A.A., Commercial Manager of the Cheltenham Gas Company.

To make the statement that every town in this country could be transformed into a health resort such as Cheltenham rightly claims to be is to invite ridicule in some quarters, even in these days; and one is still asked by what process or series of processes it is possible to make health resorts from such material as exists in our Black Country and other industrial centres.

The first essential of a health resort is clean air, and consequently a chance for the life-giving sun's rays to be felt. To privileged dwellers in beautiful towns, the matter might not appear of vital concern (though even in Cheltenham we know what a foul thing our neighbour's chimney can be); but what of those who are condemned to spend their lives amid the grime and dirt of industrial towns, deprived of their fair share of sunlight and fresh air? To them it is a matter of paramount importance—a matter of life and death. For it must be remembered that on the authority of great medical men a smoke-laden atmosphere is particularly favourable to diseases of the lungs and the respiratory organs, and is the primary cause of that essentially English disease—rickets. A certain Medical Officer of Health stated recently that one in

every four deaths in 1925 in three London Boroughs was due to lung complaints. "Domestic smoke," he added, "is greater in quantity and more harmful in quality than factory smoke. The smoke evil is the greatest enemy to people who live in cities."

Dr. Greenwood, of the Ministry of Health, has said: "It is just as hard to earn a living in Reading as in Bolton, but it is much easier to die—nearly twice as easy if you are a man between 45 and 65—in Bolton than in Reading." The abolition of the smoke evil is of supreme national importance, not only for reasons of health as affecting our future as a nation—a future in which the energy and efficiency of our people are necessary to maintain for us a foremost place among world powers—but because of wastage and damage to property. In Manchester alone it is computed that smoke increases the cost of household washing by over £290,000 a year. Sir Frank Baines, Director of H.M. Office of Works, stated in 1924 that his Department spent £1,750,000 a year in looking after Government Buildings, and that from 30 to 40 p.ct. of this might be saved if the air were acid-free and smokeless.

Only last week Dr. A. W. Hill, Director of Kew Gardens, found it necessary to explain to a newspaper correspondent the reason for the blighted blossoms which have disappointed so many visitors to the Gardens this spring. "The unusual prevalence of east winds has brought a good deal of smoke to the gardens," he said. The old trouble—smoke dealing out destruction to living matter. But Dr. Hill had not lost hope. He thought the smoke nuisance was not so bad as it was five years ago.

Now it is known to all members of this conference that the evils to which I have referred are preventable; that the stigma of having a large slice of this fair land of ours deservedly called the "Black Country" can be removed, and that no longer need the dense smoke pall be regarded as a permanent feature of our industrial areas. We know it is preventable because the experiment has been tried successfully in Germany and the United States.

"If preventable, then why not prevented?" asks Dr. Saleeby. How are we to make health resorts of those towns which constitute "The Potteries," or those densely-populated areas of South Lancashire? The answer is, By abolishing the use of crude coal as a fuel. It is curious to recall that its use was actually prohibited by royal proclamation in 1306. Again in 1648 the citizens of London petitioned Parliament against the importation of coal from Newcastle because of the smoke nuisance created by its use, and it is significant that the question, ever a menacing one, has never been allowed to drop. Where legislation has failed to provide a remedy, science has found a way; and while Governments have concentrated on palliatives and cures in the form of sanatoria, health centres, and clinics, rather than on preventive measures, the gas industry, actually hampered by legislation for nearly half-a-century, has won the first stage of the fight. Now with the progress of gas, the smoke curse is rapidly waning.

Gas, the purified spirit of coal, is the alternative to crude coal. The ineffectiveness of the measures of 1306 and 1648 was due largely to the absence of alternative fuels; but to-day we have in gas a fuel that is smokeless, dirtless, labour-eliminating, and economical—a fuel without rival for an ever-increasing range of industrial and domestic purposes.

Our President has recited a few statistics indicative of the growth of the industry in Cheltenham; and most of those present to-day could claim similar or even better achievements in the towns in which they are putting up such a splendid fight in the interests of public health. I would just like to add to the statement of the President that the total number of the larger gas-consuming appliances sold in Cheltenham during the past five years is 7500; and I trust this will be a cause of satisfaction to those residents whose premises are made to look so attractive in their exterior coating of light paint.

The gas industry has filled with distinction the rôle of "Champion of the housewife," and has thereby earned the gratitude of tens of thousands of housewives in gaining for them some respite from the thraldom of work inseparable from the old kitchen range.

To quote once more our own undertaking, which serves a population of approximately 50,000, or about 10,000 to 12,000 households, we have out on simple hire alone 9000 gas cookers. When you add to this number the 2000 odd consumers who have purchased their own cookers during the past five years, it will be seen that practically every household in the area of supply uses gas for cooking. This surely is evidence of what the gas industry has done for the housewife.

It might be argued that there are other cures available. So there are; but apart from smoke prevention they have little else to recommend them, and in any case they are out of reach of the great majority of people.

When all have learned the superlative claims of gas (and the "B.C.G.A." are doing wonderful things in this respect) to be the best of all domestic fuels, sunlight and beauty will be won again for Britain. Our gloomy, smoke-ridden towns will become, in the truest sense, health resorts, and the inhabitants will have the leisure to enjoy really clean air and more sunlight.

Discussion.

Mr. C. M. D. BELTON (Shrewsbury) said that the motto of the meeting so far seemed to have been "Cleanliness"—clear air, clean food, clean houses, and personal cleanliness. The corollary was, "Use Gas." They realized that, to a certain extent, the public already appreciated the advantages of employing gas for some of the purposes which had been alluded to that morning. There were, however, other uses for gas which were not so well known and practised. The use of gas for providing a plentiful and ever-ready supply of hot water could be extended. Thermostatic control had now been incorporated in many gas appliances, and had proved of great value. The use of gas for ripening bananas was now extensive. Gas should also be employed for the destruction of refuse in the homes. Under the present system 50 p.ct. of the refuse was redistributed about the streets. The whole question of health was wrapped up in the necessity for cleaner air; and this could only be obtained by the elimination of the coal fire.

Mr. J. WESLEY WHIMSTER (Bath) remarked that much had been said about the use of gas as a necessity for the welfare of the community; but he had not realized until a few days ago that it affected the spiritual welfare of the community. He had received a letter from a Vicar in the North saying that he had been offered a benefice at a little village near Bath, in which the Bath Gas Company had the powers of supply. He asked whether the Gas Company were likely to extend their supply to the village, for that would have an important bearing upon his decision. [Laughter.] A great deal more might be done by house-to-house inspection and canvassing. Bath had undertaken such a canvass, and had found it most advantageous.

Mr. P. N. LANGFORD (Coventry) observed that Coventry had made great strides in the use of gas. Forty p.ct. of the gas manufactured in Coventry was used for industrial purposes. The town could claim to be practically free from smoke; and this had a great deal to do with the large reduction of the death rate during the last quarter-of-a-century.

Mr. R. J. ROGERS (Birmingham) agreed that the chimney was one of the most efficient forms of ventilation. In ancient towns the old houses presented no difficulty when converted to gas heating; but in the new houses a great deal of trouble was being encountered in the matter of ventilation. In Birmingham they were experiencing considerable difficulty in securing sufficient ventilation when installing gas fires, and they were doing their utmost to educate architects and builders on the subject, and to get them to realize that the most efficient method of ventilation was by means of the chimney. It had to be brought home to architects and builders that, to fail to run gas flues up to the top of the houses, was a danger to the community. The health of the people in the new houses was being sacrificed to the æsthetic tastes of the architects and builders.

Mr. MASON said that it was encouraging for gas men to know that there was now a definite movement in favour of what they had been advocating for so long.

Votes of thanks were accorded to the speakers for their addresses.

LUNCHEON.

The MAYOR OF CHELTENHAM (Alderman C. H. Margrett), supported by the Chairman, presided at the luncheon at the Queen's Hotel.

Sir ALBERT BALL (Nottingham), in proposing the toast of "The Mayor and Corporation of Cheltenham," said that the Government were unfairly nursing the electricity industry to the detriment of the gas industry. Given fair treatment, the gas undertakings of the country would continue to play an important and useful part in the furtherance of the country.

The MAYOR responded, and paid a tribute to those engaged in the gas industry in Cheltenham.

Mr. T. WILFRED WAITE (Chairman of the Cheltenham Chamber of Commerce) proposed "The Gas Industry," and referred to the advantage which Cheltenham had received from the industry, and to the great improvements in appliances in recent years.

Mr. BELTON, responding, said that, though they were protected from overlapping, the industry had no monopoly, and had to face keen competition from electricity and oil. That the industry was by no means superseded by electricity was obvious from the fact that the industry at present carbonized 18 million tons of coal annually; produced 300,000 million c.ft. of gas; 12 million tons of coke and breeze; 200 million gallons of tar; and 126,000 tons of sulphate of ammonia. They had over 8¼ million consumers, nearly five millions of whom used prepayment meters—a great boon to the poor. The gas industry was in the position of being the elder sister of electricity, and had to be content to wear the flannel petticoats imposed by their grandmothers eighty years ago, while their younger sister electricity was able to dazzle the country with the short frocks and silk stockings bestowed upon her by her benign parents, the Government of to-day. [Laughter.]

Mr. MASON proposed "The Chairman." He said it was encouraging to find that, in a fine town like Cheltenham, the gas industry was by no means a back number, but was vigorous and progressive.

Mr. WYATT responded.

SUNLIGHT AND HEALTH.

In the afternoon, Dr. C. W. SALEEBY, Chairman of the Sunlight League, gave a lecture on "Sunlight and Health."

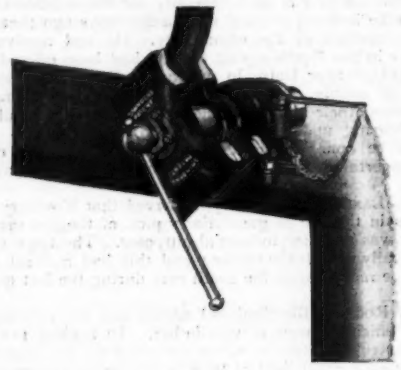
The MAYOR OF CHELTENHAM, who presided, said that the question of the smoke nuisance had occupied the attention of Government Committees, and such conditions had been revealed that anyone who could do anything to abate the nuisance would deserve the gratitude of the people of the country.

THE VIRTUES OF A VICE.

Swindens Patent Revolving Head.

A development in engineers' vices which will interest the gas industry is marked by the Swindens new patent revolving head vice with double jaws. The difficulty of obtaining a rigid grip on pipe of awkward length and shape is a frequent source of lost time and bad work; and in maintenance and repair work generally, the restricted action of the ordinary vice often makes it necessary to clamp a job in a position that is far from convenient from the operating standpoint.

In Swindens vice there are two jaws—one fitted with the usual flat serrated liners, and the other with curved grooved liners which ensure a positive non-slipping grip on pipe or any kind of round or irregular work. These curved liners run the full width of the jaws, so that pressure is exerted over a large



surface, preventing any twisting or movement during screwing or similar work. The entire head of the vice rotates freely round a horizontal axis—that is, in the plane of operation—and is locked at any desired position by a simple movement of a lever. The simplicity of the action is one of the outstanding features of the vice.

The three principal parts are machined from high-tensile steel castings with a breaking strain of 35 to 40 tons per sq.in. The barrel of the front jaw casting traverses the entire length of the back jaw casting, giving a bearing surface which makes for great strength under severe stresses. Both are locked in relation to one another by a slot in the front jaw barrel engaging the centre screw nut, permitting lateral movement only without turning. This screw nut is a solid steel drop forging, heat treated, and tapped a robust square thread which permits of heavy leverage on the screw handle without distortion. The screw itself is made from high-tensile steel with a 35 to 40 tons per sq.in. breaking strain, and is engaged by the screw nut around its entire circumference—an important feature in relation to the life of a vice and its ability to stand up to ill usage.

The rotating movement of the vice is controlled by the friction hold of the base casting, which is tightened or released by a lever at the right side. This grip is so sensitive that a quarter turn will give a lock that withstands severe hammering, chipping, pipe bending, and every kind of work for which a vice is normally used. There are no springs or ratchets. The opening of the jaws is entirely independent of the rotating movement, so that an object is first clamped in the manner best calculated to ensure a positive hold, and then turned to, and locked at, the most convenient working position. When, as frequently happens, several parts of the object are to be worked upon, these positions are obtained by a simple movement of the lever, without removal from the jaws and reclamping. Turning the head at an angle or in a horizontal position enables a length of bar or pipe, or any long object, to rest on the ground and yet be gripped by the full width of the vice jaws for steady operation, without additional support. In these positions also, clearance is obtained without interference by the base of the vice.

The vice jaws open square in all sizes—that is to say, a 2-in. vice has a maximum jaw opening of 2 in., and will grip 2-in. outside diameter pipe, and so on. The hardened steel jaw liners are replaceable, and fibre liners are available of both flat and curved types.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

Visit to Motherwell Gas-Works.

On Saturday, April 20, some 60 members of the Association visited the Motherwell Gas-Works. The party was received by Mr. J. Wilson, the Engineer and Manager.

HISTORICAL.

Gas first made itself known in Motherwell in the year 1825, in connection with the communistic adventure known as the "Orbiston" movement. The venture, however, collapsed, and it was not till 1849 that Mr. Bartholomew, Gas Engineer at Glasgow, described as "the most renowned practical Gas Engineer," was called in to prepare plans for the Motherwell works. In 1850, the inhabitants received a supply of gas at 8s. 6d. per 1000 c.ft., while non-meter consumers were charged 13s. per light per annum, being allowed lights from sunset to 11 p.m., and from 6 a.m. to sunrise.

From that time till 1914, there was a steady increase in consumption, rising from 5 million c.ft. in 1870 to 128 million in 1914. In this year, the Motherwell Town Council purchased the works from the Gas Company for £136,000, and immediately thereafter inaugurated a complete scheme of reconstruction, erecting the "Wilson-Glasgow" vertical retort bench. In 1920, when the output of gas had increased to 180 million, the Motherwell and Wishaw Town Councils decided to amalgamate, and the two works were brought under one management, making a total output for the combined Burgh of 295 million.

Practically no record of the old Wishaw Gas Company is available, but it would appear, according to some authorities, that these works were inaugurated about six years prior to the Motherwell works, and were transferred to the Wishaw Corporation for the meagre price of £12,000 in 1880.

After the amalgamation, the distribution systems were gradually linked up; and, in 1926, when the output had touched 394 million, a scheme of centralization was adopted, whereby the manufacturing operations are confined to the Motherwell works. The works to-day represent a combination of both the Motherwell and Wishaw plant. These have been united in such a manner as to reduce the labour costs, and connected up so that the highest efficiency can be obtained, having regard to the available ground space and disposition of the existing plant. This scheme, including the introduction of the railway siding, tipping plant, dismantling and transference of the "Glover-West" plant, and the high-pressure distribution system, has involved an expenditure of approximately £40,000.

THE WORKS.

The railway siding enters at the back of the works, and divides into three sections:

(*a*) The "high-level" passes up behind the carbonizing plant and over the top of the coal store by means of a reinforced concrete gantry 20 ft. high, which is fitted with a receiving hopper and two 14-in. "Waller" type ram tippers, capable of dealing with 20-ton wagons, and tipping 40 tons of coal in about three minutes. These rams are operated by a "three-throw" electrically driven pump. The coal store is 108 ft. by 62 ft. by 20 ft. high, and has a capacity of approximately 3000 tons.

(*b*) The "low-level" passes down in front of the retort benches and under the coke screening plant. From this point, all the coke can be dealt with, together with sulphate, tar, &c., leaving the works, and any material entering. The capacity of the coke hoppers is approximately 300 tons.

(*c*) The siding accommodation, which has three "lyes," has a capacity of approximately 40 wagons.

The total length of the railway siding is over one mile. The traffic inside the works is handled by means of a 16-ton "Sentinel" steam locomotive burning coke. This is sufficiently powerful to pull successfully about 80 tons gross up the 1 in 30 gradient in the works.

THE RETORT BENCH.

The "Wilson" vertical retort bench comprises six ovens of six retorts each. These retorts, which are built of firebrick, are 23 ft. long, parallel two-thirds up, the top dimensions being 40 in. by 10 in., and the bottom 48 in. by 18 in. They are capable of carbonizing 3 tons of coal per retort per day, and the bench has a nominal capacity of 1,250,000 c.ft. per day.

This bench was originally worked so that each oven had a definite number of hours (charge), varying from four to eight

hours according to the amount of gas required. This method has now been superseded by discharging a specific number of retorts per shift at regular intervals. The number of discharges, or bogies drawn, is increased or decreased to meet any variations in the demand for gas. The retorts are discharged in strict rotation, irrespective of the number of bogies drawn per hour. By this method, a more even flow of gas is ensured. The amount of coke withdrawn is about 7½ cwts. per bogie, which is equivalent to approximately 10 cwts. of coal per charge.

The "Glover-West" bench consists, at present, of one setting of eight retorts 33 in. by 10 in. at the top, and 39 in. diameter at the bottom of the steaming chamber. They are 25 ft. long—representing an increase of 4 ft. 6 in. on the old Wishaw retort—of the latest steaming design, and are built of Stein's silica bricks, with fireclay top and bottom sections. The steaming chambers are fitted with the new "West-Taylor" valve, which permits of a definite amount of steam passing per hour, depending, of course, on the steam pressure. The retorts, which are fitted with ratchet extractor gearing, have a capacity of 4 tons per retort per day, and a total output of 600,000 c.ft. per day. There is still accommodation for a further twelve retorts in the same house.

Working Results.

At present the retorts are not working at full capacity; the "Wilson" bench carbonizing only about 2 tons per retort per day (drawing 18 bogies per shift), while the "Glover-West" retorts are carbonizing 3 tons per day.

The average retort bench temperatures are 1050° C. to 1100° C. for the "Wilson" bench, and in one "Glover-West" bench, with the silica retorts, a temperature of about 1200° C. in the combustion chambers is maintained.

Under these conditions are extracted 18,000 to 18,500 c.ft. of 400 B.Th.U. gas, or 73 therms per ton; about 18 galls. of tar per ton, and 35 to 40 lbs. of sulphate of ammonia. This figure has been as high as 46 lbs. per ton. The coke available for sale is approximately 7 cwts. per ton, which leaves about 3 cwts. per ton for the producers.

After the inspection the members were entertained at tea by the Motherwell and Wishaw Corporation Gas Department.

Bailie Frew, Convener of the Gas Committee, cordially welcomed the Juniors. He expressed his regret at the death of Mr. Alex. Wilson, late Engineer and Manager to the Glasgow Corporation Gas Department. It was peculiar that at this time the Juniors should visit the works of Mr. J. Wilson, the son of the founder of the Association.

Mr. J. Murray (President) made reference to the passing of Mr. Wilson, the founder. He explained the intimate interest Mr. Wilson had always taken in the Juniors, and that the sincere appreciation would be recorded in the minutes. The Scottish Western Juniors were particularly anxious to visit the gas undertaking of Motherwell; for the Motherwell Corporation in their wisdom had chosen one of their past Presidents, in the person of Mr. John Wilson, to be their Engineer and Manager. Mr. Murray spoke of the paper which had gained a prize—"The Unification of Gas Undertakings," by Mr. Alex. McDonald, B.Sc., Assistant to Mr. Wilson. This had "whetted the appetites" for the visit; and the visit had fully realized all expectations. He thanked the staff for the time so kindly given.

Mr. Grafton (Glasgow) expressed his pleasure at being present. The question of price was the main and ultimate one. Cheaper gas was the aim. They must give a "Satisfactory Service" at a competitive and favourable price.

Mr. R. D. Keillor (Greenock) expressed his pleasure at being present. A feature which appealed to him was the foresight of Mr. Wilson, which was evidenced at many points in the works; and he congratulated Mr. Wilson on the engineering skill displayed in the lay-out.

Mr. Poulson (Glover-West) thanked Bailie Frew for his kind remarks. This was the first time a gas-works had been completely removed and re-erected; and Motherwell and Mr. J. Wilson deserved credit for their courage. As long as the gas industry had engineers like Mr. Wilson, there need be no fear from electricity.

Mr. J. Wilson (Motherwell) thanked the members for the sympathy shown in his recent bereavement. Mr. Grafton had referred to cheaper gas. This was the only weapon with which they could combat electricity, and all effort was directed towards this end. It was 9 years since the Juniors had visited Motherwell, and he hoped that there would be a future visit. He thanked Mr. Poulson for all that he had done to ensure success.

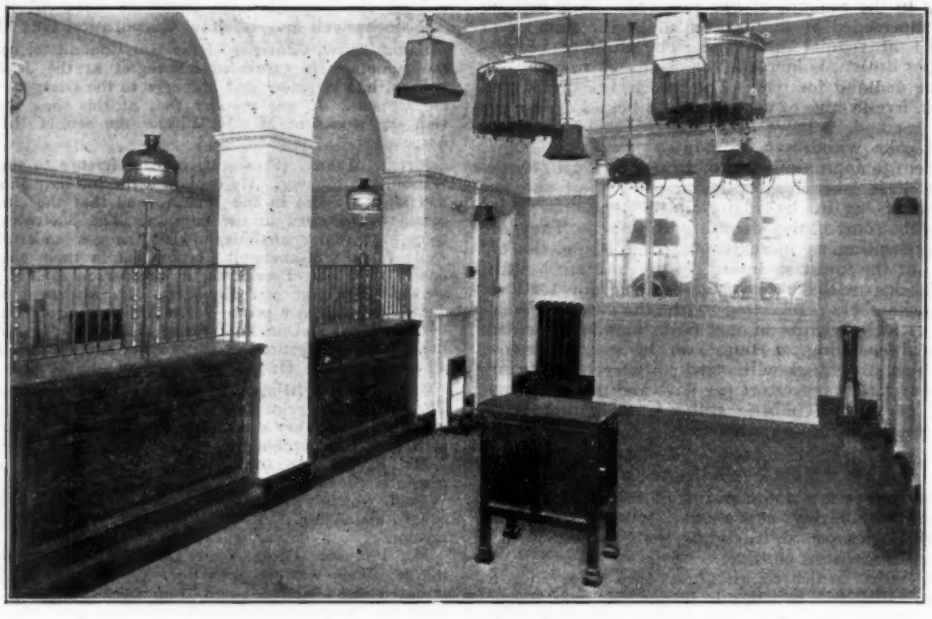
GAS LIGHT AND COKE COMPANY.

New Offices and Showrooms at Hounslow.

VIEW FROM THE MAIN ENTRANCE.

To enable them the better to give adequate facilities and efficient service to some 26,000 of their customers resident in Hounslow, Staines, and Sunbury, and the more satisfactorily to cope with the great expansion of their business in these rapidly growing districts, the Directors of the Gas Light and Coke Company decided some time ago to build a new Showroom and District Office at 178/180, High Street Hounslow, and these were formally opened on Wednesday, April 24.

There has been a rapid growth of population in the area served from this centre, and, in consequence, the demand for gas fittings and appliances has greatly increased, so that the need for this enlargement of the Company's means for serving the public in the district has become urgent. One of the outstanding features in the growth of the district is that during the past twelve months nearly 1600 new houses have been built, and over 2600 houses are in course of erection, with more to follow. Some of these houses will be "all-gas," and in every



A RANGE OF SWITCH CONTROLLED PENDANTS.

case gas will be used for some or all of the purposes to which it can be applied in the home.

At the new Hounslow showroom the public will find a good selection of up-to-date artistic lighting fittings and shades; efficient gas cooking appliances; gas fires suited to every style of furnishing and decoration; gas geysers and hot water circulators; gas-heated wash coppers; gas-heated irons; refrigerators; and other domestic and industrial labour-saving appliances. There, also, consumers will be able to make their inquiries; obtain advice upon the economical use of gas for any purpose, domestic or industrial; lodge their complaints, if any; and pay their bills.

The Architects responsible for the design, arrangement, decoration, and furnishing of the new showroom, offices, and stores are Messrs. Walter J. Tapper, A.R.A., President R.I.B.A., and Austen Hall, F.R.I.B.A. The Contractors employed were Messrs. William Downs, Ltd., of 12, Hampton Street, S.E. 17.

The opening ceremony was performed by Mr. A. L. Lang, J.P., Chairman of the Heston and Isleworth Urban District Council, who was accompanied by Mrs. Lang, and was supported by members and the principal officers of the Heston and Isleworth Urban District Council, the Hayes Urban District Council, the Parish Councils of Bedfont, Harlington, and Cranford, and the local Chamber of Commerce, as well as prominent residents in the district.

The visitors were welcomed by the Governor of the Company, Sir David Milne-Watson, LL.D., D.L., and other members of the Court of Directors. With the Directors there were the General Manager (Mr. R. W. Foot); the Chief Engineer (Mr. T. Hardie); the Secretary (Mr. W. L. Galbraith); the Chief Accountant (Mr. H. E. Ibbs); the Superintendent of the Rental Department (Mr. L. M. Simmons); the Chief Officer of Stores (Mr. W. McDowall); the Controller of Gas Sales (Mr. F. W. Goodenough); the Deputy-Controller (Mr. Stephen Lacey); Mr. F. J. G. Blondin (the Inspector-in-Charge), together with the other senior officers of the Gas Sales Department. A bouquet was presented to Mrs. Lang previous to the opening ceremony; and tea was served in the general office—Sir David Milne-Watson presiding.

Sir David Milne-Watson, in asking Mr. Lang formally to declare the premises open, said that the Gas Light and Coke Company were pursuing the policy of showing gas to the best possible advantage, and the appliances in the most attractive form. He hoped that these showrooms would serve this purpose. It was the ambition of the Company, he said, to be the most efficient organization in London. Sir David referred to the rapid growth of the Hounslow district in the last few months. The population, which had more than doubled in the last twelve months, was now about 72,000, and it was hoped that the quarter-million mark would be reached before long; and it was their desire to serve this quarter of a million with gas.

Sir David emphasized that gas and electricity were not out to ruin each other, and this was evidenced on this occasion by the fact that the Chairman of the local electricity undertaking was one of the guests. There was plenty of room for both; for they both helped to lessen the smoke evil and keep the air pure, and by their united efforts they would be going a long way towards making the atmosphere clear. He took this opportunity of congratulating the Architects, Mr. W. T. Tapper and Mr. Austen Hall, on their really fine achievement in the erection of these buildings. He then called upon Mr. Lang formally to declare the premises open to the public.

Mr. A. L. Lang, J.P., said that, though he had been asked as Chairman of the Urban District Council to open these premises, actually he was no longer Chairman, as the Council Meeting was held on the previous day, when a new Chairman was elected. That Chairman, however, was with them then in the person of Mr. Nias, who was also the Chairman of the electricity undertaking, as the Governor had stated. The Council, continued Mr. Lang, were always ready and willing to encourage enterprises such as these in the district, and the Gas Light and Coke Company had done much in helping to make the town one of the most important and up-to-date in Middlesex. He agreed that there was plenty of room for both gas and electricity; in fact the proximity of the two undertakings was to the good of both, as it created a healthy rivalry—that kind of healthy rivalry which had done so much towards the betterment of British industry in general—and so was beneficial both to the concerns and to the community.

He recalled how useful gas had been during the strike in 1926, and how, thanks to the gas companies, the people had been enabled to "keep the home fires burning" when their coal supply had run out. It was undoubtedly the determination of the management of the gas companies to make gas so necessary and satisfactory that they could not do without it.

The Gas Light and Coke Company built their premises well, continued Mr. Lang, and were fortunate in having two such eminent Architects to design their buildings. It was a spirit that they in Hounslow welcomed, as the building contributed greatly to the dignity of the town. He referred to the cordial relations which existed between the Company and the Local Authority, and in declaring the premises formally open, he wished the Company every success in their enterprise, and hoped that the people of the district would take the fullest advantage of the facilities offered, and, by using more gas, help to make their home life better.

Mr. H. J. Nias, M.B.E., J.P., Chairman of the Heston and Isleworth Electricity Committee, in thanking the Gas Light and Coke Company for their hospitality, endorsed the previous speakers' remarks with regard to gas and electricity, and the cordial relationship between the Company and the Local Authority. He mentioned the enormous growth recently of the district, which was promoted by the Local Authority, and which was all to the good of the undertakings with which they and he were concerned. He concluded by wishing the Company every success in the future.

Description of the Premises.

The showroom, on the ground floor, is divided into three sections. The main entrance opens direct into the high-grade cooker and fire section (the fires being set to harmonize with artistic surrounds of all descriptions), in which there is also a bath and geyser, and a gas-heated copper for demonstration purposes. The next section is devoted entirely to cookers supplied on hire terms, a coke boiler and gas combination range. In the third section there is the counter for the payment of accounts, a selection of fires, and a comprehensive display of lighting fittings, demonstrating in particular the system of distant control. At the back is a large recreation room for the staff.

On the first floor are situated the main office, overlooking the High Street, and smaller offices for collectors and for other officials. There is a private telephone exchange switchboard in the main office.

About fifty yards behind the showrooms, approached by a lane from the High Street, are the fitters' shops and stores. These are most up-to-date and spacious, and all the various pipes, fittings, meters, &c., are stored in their special compartments, being easily accessible when required. Above the stores are the foremen's offices.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Co-Ordination of Gas Supply in Scotland.

SIR,—In your issue for April 17 there appears the Presidential Address to the North British Association of Gas Engineers, which I have had an opportunity of perusing.

I am specially interested in the reference made to Greenock's unsuccessful attempt to force the amalgamation of the Burghs of Greenock, Port Glasgow, and Gourock, and of the gas supply. It seems to me from what is stated that there is an inference that Port Glasgow had rushed into what is stated to be "extravagant expenditure," notwithstanding Greenock's offer in their amalgamation proceedings of 1926. With a full knowledge of what actually took place, I should like to take this opportunity of letting those who are interested have the facts of the case.

The question is put by the President, "Why should Greenock not supply gas to Gourock and Port Glasgow?" This can be answered, so far as Port Glasgow is concerned, by another question, "Why did Greenock fail to reply to Port Glasgow's inquiry in 1914 as to undertaking the supply?" That inquiry was made before Port Glasgow had incurred one single penny in putting down new works. As there was no reply, they were forced to proceed with their new works, which were completed in 1921. Greenock at the same time proceeded to instal new plant at some considerable cost, and resolved in 1920 to borrow £100,000 for an additional section of vertical retorts and other plant. In 1926, when their Amalgamation Bill was promoted, they claimed to be in the position of undertaking the supply for the three Burghs, and in support of their case offered gas at the Greenock rate. Naturally considerable doubt was stated to the possibility of any undertaking being able to double its capital debt by relieving the two outside Burghs of their debt, and at the same time to lower the rates in their areas without increasing Greenock's rate. The offer made did not satisfy the House of Commons Committee, who were informed of Greenock's previous lack of interest.

The net result appears to be that Greenock had an opportunity in 1914 to undertake the supply, which they claim they were able to do, but undoubtedly failed to grasp the opportunity. Notwithstanding this, Government Departments with a controlling voice in capital expenditure are twitted in the Address with allowing Port Glasgow to go on with new works; while there are suggestions of municipal distrust and "gross indulgence of municipal freedom" in Port Glasgow having done their duty in providing these new works, and, having done so, in not allowing Greenock in 1926 to take in Port Glasgow on a promise of gas at the Greenock rate.

It seems a pity that the President should in the circumstances have been influenced to use Greenock information, and thus attempt to place discredit on Port Glasgow, who, as the result of Greenock's inaction, had no other alternative but to do their duty and maintain their Undertaking.

"FAIR-PLAY."

April 25, 1929.

Maintenance Costs of Woodall-Duckham Verticals.

SIR,—With reference to my remarks upon the paper given by Mr. Ivor Thomas at the recent meeting, at Neath, of the Wales and Monmouthshire Junior Gas Association, I notice that your report of same ("JOURNAL" for April 3, p. 33) shows that I gave a figure of 3s. per ton of coal carbonized as being the maintenance figure on the Woodall-Duckham vertical retort installation at the Neath Works. This should have read 3d. per ton of coal carbonized, and 0·041d. per therm of gas produced. I shall be glad if you will kindly publish this amendment, in fairness to Messrs. Woodall-Duckham.

W. CLARK JACKSON,
Engineer and Manager.

Neath Corporation Gas Department,
April 25, 1929.

PARLIAMENTARY INTELLIGENCE.

[From Our Special Correspondents.]

HOUSE OF LORDS.

The South Suburban Gas Bill received the Royal Assent on April 25; and the following Special Orders have been referred to the Special Orders Committee: Cheshunt and District, Cirencester, and Southport.

UNOPPOSED BILLS COMMITTEE.

A number of Bills which included provisions relating to gas supply were considered during the past week by the Unopposed Bills Committee of the House of Lords, over which the Chairman of Committees (the Earl of Donoughmore) presides; and these have been ordered to be reported for third reading.

South Suburban Gas Company's Bill.

The first of these Bills was that promoted by the South Suburban Gas Company, the main purpose of which is to authorize the carrying into effect of an agreement to transfer the undertaking of the Northfleet and Greenhithe Gas Company, Ltd., to the South Suburban Company, and to extend the limits of supply of the latter Company accordingly (see "JOURNAL" for Jan. 23, p. 210).

The Bill was unopposed also in the House of Commons (see "JOURNAL" for March 13, p. 749).

Windermere Urban District Council Bill.

On Tuesday, April 23, the Bill of the Windermere Urban District Council was considered. This is to authorize the Urban District Council to purchase the undertaking of the Windermere District Gas and Water Company; and it is promoted as the result of the insertion of a clause a year ago in a Bill promoted by the Company, to the effect that, if the Urban District Council should introduce a Bill in the present session to empower them to purchase the undertaking, the Company should not oppose except in so far as they might deem it necessary in order to secure provisions to protect their interests.

The details of the Council's Bill were set out in the "JOURNAL" for Jan. 30, p. 272.

Newcastle-upon-Tyne and Gateshead Gas Bill.

Another unopposed Bill was that promoted by the Newcastle-upon-Tyne and Gateshead Gas Company, one of the main purposes of which is to apply to the Company the basic price and dividend system of charge. There are a number of other provisions in the Bill dealing with prices of supply to public lamps, bulk supplies, the making of agreements for co-operation with other Gas Companies, &c. (see "JOURNAL" for Jan. 9, p. 93).

Westminster City (Millbank) Improvement.

Among the Bills considered on Wednesday, April 24, was one making provision for the re-housing of the working-class inhabitants of the Millbank Estate, Westminster, for the carrying out of street improvements in connection with the development of the Estate, &c.

The Gas Light and Coke Company petitioned against this Bill in order to protect their rights of access to their mains in the affected area; and a clause has been inserted by agreement for this purpose. This provides that if the streets are stopped up temporarily under the powers of the Bill, the Gas Light and Coke Company are to have such rights of access to their mains and apparatus in such streets as they had before the passing of the Bill, and shall be at liberty to execute the necessary works of repair, maintenance, &c. It is also provided that the City Council are to give the Company a month's notice of their intention to alter the level of Page Street or to commence work in streets in which apparatus is situated, and to provide the necessary plans and description of such work; and the Company are to have the right, within 21 days of the receipt of the notice, if the level of Page Street is to be raised more than 5 ft. above the existing apparatus of the Company, to require the Council to raise the level of such apparatus as may be deemed necessary. The Company may carry out the work, if desired, at the expense of the Corporation. There are also provisions to guard against the removal of apparatus or interference with the continuation of the supply until sufficient substituted apparatus is provided. In the event of damage to, or interruption of, the supply, the Council are to pay the reasonable costs incurred in making it good, and to make compensation for loss, and indemnify the Company against claims in respect thereof. The Council have also to bear the reasonable expense of repairs and renewals of the Company's apparatus rendered necessary by the defaults of the Council's contractors or servants, or by subsidence resulting from the carrying-out of the works during construction or after completion. If apparatus is rendered derelict or unnecessary by reason of the carrying-out of the works, the Council have to pay to the Company the value of the apparatus, unless substituted apparatus is provided. Differences are to be settled by arbitration.

Gas Light and Coke Company's Bill.

This Bill provides for the amalgamation with the Gas Light and Coke Company of the undertakings of the Pinner Gas Company, Ltd., and the Grays and Tilbury Gas Company (see "JOURNAL" for Jan. 2, p. 40).

The Bill was unopposed in the House of Commons (see "JOURNAL" for March 27, p. 871).

Winchester Water and Gas Bill.

This provides for the extension of the Winchester Water and Gas Company's gas and water supply areas, the raising of further capital, and other matters of a general character (see "JOURNAL" for Jan. 30, p. 272).

In the House of Commons the Bill was opposed by the Winchester Corporation, who sought the insertion of a clause to provide that,

if in the next session of Parliament they promoted a Bill for the purpose of purchasing the Company's undertaking, the Company should not oppose except in regard to matters of detail. The Corporation, however, were not successful (see "JOURNAL" for March 27, p. 872).

HOUSE OF COMMONS.

Tube Explosions.

Sir R. THOMAS asked the Postmaster-General what action he had taken or was about to take, as a result of the Report made by the Commissioners appointed to inquire into the circumstances of the New Oxford Street explosions on Dec. 20 and 21, who had recommended the immediate examination of the whole of the existing Post Office tube, the installation of adequate ventilation, and the employment of continuous detectors to give warning of the presence of gas; and if he could make a statement regarding the estimated extent and the cost of the alterations required.

Sir W. MITCHELL-THOMSON replied that the Commissioners' recommendations were receiving the close attention of his advisers, but the nature and extent of the work involved were such that it must be some time before it would be possible to make any statement of the kind desired.

Private Bills and Special Orders.

The Wandsworth, Wimbledon, and Epsom District Gas Bill came before the Unopposed Bills Committee on April 30. The Yorktown (Camberley) and District Gas and Electricity Bill passed its Third Reading on April 29, and the Imperial Continental Gas Bill its Second Reading on the same date. The Southport Special Order came before the House for approval on April 30. The Barnard Castle Order was put down for approval on the same date, subject to an amendment on Clause 12 designed to secure the priority of principal moneys secured by existing mortgages.

The following Bills have passed the Committee Stage and are awaiting Third Reading: Gas Light and Coke Company, Winchester Water and Gas Company, Newcastle-upon-Tyne and Gateshead Gas Company.

GAS UNDERTAKINGS BILL READ THE THIRD TIME.

When the Committee stage of the Bill was taken on Monday evening,

Mr. W. T. KELLY said there were many cases in which sub-tenants paid, through subsidiary meters, a higher price for gas than was charged to the main tenant or landlord. He hoped that something would be done to put a stop to this.

Mr. H. G. WILLIAMS (Parliamentary Secretary to the Board of Trade) remarked that the grievance was not one which was limited to gas, but applied also to electricity. It was to the interest of the gas undertaking that gas should be sold to the real consumer as cheaply as possible; but he did not think that this particular matter could be dealt with in the present Bill.

Mr. KELLY did not further press the matter.

Mr. A. V. ALEXANDER stated that some people were concerned with the results which might accrue from one of the minor amendments to the First Schedule, which it was thought was capable of being used rather widely, and which, it was even feared, might give the Board of Trade power to do away with the sliding-scale.

Mr. WILLIAMS did not think anyone need be concerned about the minor amendment in question. If for any reason the fundamental conditions on which the sliding-scale was drawn up were altered, then clearly the basis of the sliding-scale ought to be changed. In order that the position might be satisfactory in the future, it seemed desirable that there should be power to make such adjustments as might be necessary. The underlying principle of the sliding-scale was preserved.

The Bill passed through Committee without amendment, and was read the third time.

UNOPPOSED BILLS COMMITTEE.

Newport (Salop) Urban District Council Bill.

This Bill was among those considered by the Unopposed Bills Committee of the House of Commons (over which Mr. J. FITZALAN HOPE, Chairman of Ways and Means, presides) on Thursday, April 25. The Urban District Council seek power to vest in them the property and liabilities of the Newport Town and Marsh Trustees. Portions of the lands involved have been leased to the Newport Gas Light and Coke Company, Ltd., for a term of years expiring in 1934, for the purpose of the construction of gas-works, subject in each case to the right of the Trustees, on the expiration of the leases, to resume possession of the lands, gas pipes, and other fixtures, &c., connected with the gasholders thereon, and the manufacture, conveyance, and consumption of the gas in the streets (see "JOURNAL" for Jan. 9, p. 94).

Mr. H. E. SWALLOW (Messrs. Lees & Co., Parliamentary Agents) said that the Trustees had been operating since 1754; their duties being to control certain common lands. They had been performing duties somewhat analogous to those of the Local Authority. In 1835 the Trustees had let land to the Gas Company on most unusual terms. The Company were to erect gas-works on the land, and supply the town with gas, and at the end of 99 years were to hand over the whole of the properties to the Trustees without payment. This was one important reason for the promotion of the present Bill, because if the works reverted to the Trustees in 1934, the latter would have no power to carry on the undertaking, but would have to sell it. (The Bill provides for the management of the gas undertaking by the Council after it has become vested in them at or before the expiration of the leases.)

The preamble of the Bill was proved by Mr. J. S. UNDERHILL, M.A., Solicitor for the Bill, and the Bill was ordered to be reported for third reading.

Yorktown (Camberley) and District Gas and Electricity Company's Bill.

This Bill also was considered by the Unopposed Committee of the House of Commons on Thursday. It provides mainly for the Yorktown Company to purchase the gas undertaking belonging to the Wokingham Corporation; the price to be paid for it being £35,600 *plus* an agreed amount for stores, &c.

Mr. J. E. M. CROWTHER (Messrs. Hargreaves & Crowther, Parliamentary Agents) said that the Yorktown Company's area surrounded the Borough of Wokingham. In 1927 the area of the borough was extended, and in the extended portion a supply was at present being given by the Company, while the original borough was supplied by the Corporation, so that at present the Company were supplying in part of the borough, and the Corporation in the other part. There were two different prices for gas ruling in the borough, but the Bill provided that there should be one price throughout the borough after the transfer. Part of the bargain made between the Company and the Corporation was that the price to be charged within the borough would be 1d. per therm less than that charged by the Company in its area outside the borough. The Company considered that the acquisition of the Corporation's undertaking would be of so great an advantage to them that they had inserted a provision that for the next seven years the price in the area of supply outside the borough was not to be more than 13d. per therm, subject to the general charges outside the control of the Company not having increased. The charge in the Company's area at present is 13·77d. per therm.

The preamble of the Bill was proved by Mr. HENRY G. HARDS (Secretary of the Company), and the Committee ordered the Bill to be reported for third reading.

The Bill was opposed by the Frimley Urban District Council in the House of Lords on matters concerning price (see "JOURNAL" for April 3, p. 39).

BIRMINGHAM CORPORATION (GENERAL POWERS) BILL.

Protection of Gas and Water Annuitants.

A General Powers Bill, promoted by the Birmingham Corporation, has been under consideration during the last few days by a Committee of the House of Lords (presided over by the MARQUIS OF BRISTOL). Among its clauses there is one providing that all money received by the Corporation on account of the revenue of each of its undertakings is to be carried to the General Rate Fund; and that expenses incurred in respect of the undertakings are to be paid out of the Fund. Another authorizes the establishment of a Consolidated Loans Fund.

These clauses were the subject of a petition by the holders of gas and water annuities granted by the Corporation, under its Acts of 1875. The object of the petitioners was to secure a provision that their rights and priorities should not be interfered with or prejudicially affected; and provisos to that effect have been added to the two referred to.

SMETHWICK CORPORATION BILL.

A General Purposes Bill, promoted by the Smethwick Corporation, contains a clause the effect of which is to enable the Corporation to provide the pipes and fittings necessary for the purpose of affording a supply of gas to houses occupied by the working class (and which have no installation for a supply of gas or electricity), at the request of the occupiers, in spite of the refusal of the landlords to give permission. [The clause is set out in the "JOURNAL" for Jan. 16, p. 161.]

Section B. of the Local Legislation Committee of the House of Commons (presided over by Sir WALTER RAINE) has been considering the Bill, and on Wednesday, April 24, dealt with this clause.

The Ministry of Health, in a report referring to this clause, asked the Committee to consider whether there was sufficient evidence to justify interference with an owner's property.

Mr. F. G. THOMAS, K.C. (for the Corporation), pointed out that the object of the clause was to enable a tenant to obtain a supply of gas if he desired it, and that the owner would suffer no harm; indeed, he would secure an advantage, in that his premises would be provided with means for a supply of gas. There were 526 houses in the borough not lighted by either gas or electricity, and that was a state of things which was prejudicial to the interests of the tenants.

The CHAIRMAN asked why the application of the clause was limited to premises occupied by "the working class."

Mr. THOMAS said it was in such premises that the deficiency existed.

Mr. ROBERT WILSON (a member of the Committee) asked if there were really landlords in Smethwick who objected to the installation of the necessary pipes and fittings in their houses.

Mr. THOMAS replied that they refused to consent. In reply to a further question, he said that the occupiers of houses having no supply of gas or electricity used oil lamps or candles for lighting.

Alderman *A. M. Williets*, J.P. (Chairman of the Corporation Gas Committee), gave evidence in support of the clause. Questioned as to the reasons why landlords placed difficulties in the way, witness said the Corporation had requested the landlords to contribute towards the cost of the services, but they had objected, though the tenants had pressed the Corporation to give a supply of gas. The service pipe between the footpath and the house, he explained, was the re-

sponsibility of the landlord. The cost of piping a house would be, possibly, £4, and the practice was to charge the consumers an annual sum of 5 p.ct. on that capital cost. Questioned with regard to fittings, he said it was most likely that the tenants of houses of the kind he had in mind would take supplies through prepayment meters, in which case fittings would be supplied.

Asked whether it was the practice of the Corporation to lead the gas pipes into the houses, he said it was, in the case of new houses, but it had not been in the case of old houses.

Mr. Wilson: Now I see why there is objection.

In reply to a question as to the practice followed in respect of new houses, witness said the Corporation supplied up to a certain length of service free, on condition that an adequate size of pipe was used for carcassing. The cost of service piping from the back of the footpath to the house was about 1s. 10d. per ft., inclusive of labour cost.

Mr. Wilson asked whether, if the Corporation made the same offer to the landlords of the old houses as was made to the owners of the new houses, the former would accept it.

Witness replied that the Corporation would be quite happy to do that. He added that the Corporation did not instal the pipes inside the new houses.

Replying to the Chairman, he said the Corporation had repeatedly endeavoured to get landlords to carcass the houses, and had offered to pay a portion of the cost of carcassing, but the landlords were not willing to provide their portion of the cost.

The Chairman said he supposed that if pipes were installed in a house under the powers of the new clause, the only responsibility of the tenant would be to pay the 5 p.ct. annual charge on the capital cost of the installation, while he was residing there; and that he would not be responsible after he had left the house.

Witness agreed, and added that no doubt the next tenant of the house would take over the installation on the same terms; the Corporation would take the risk of his not doing so, however.

Arising out of a remark by a representative of the Ministry of Health, that there was no definition of "working class," the clause was amended to make it applicable to all classes of property, and was approved by the Committee.

MISCELLANEOUS NEWS.

BOMBAY GAS COMPANY, LIMITED.

Ordinary General Meeting.

The Ordinary General Meeting of the Company was held at the London Offices, Moorgate Street Chambers, E.C., on Wednesday, April 24—Mr. William Graham Bradshaw, C.B.E. (the Chairman), presiding.

The Secretary (Mr. A. Dickson) read the notice convening the meeting and the report of the Auditors; and the Directors' report and the statement of accounts for the year ended Dec. 31 were taken as read.

Chairman's Address.

The Chairman said: It is necessary, in order to enable you to form a correct estimate of the results of the work of the year 1928, with which we have to deal to-day, and of the accounts which we present to you, to bring before you the conditions under which the business of the Company was carried on, and the difficulties which had to be met and surmounted.

As regards India, the Monsoon was once more good and sufficient. The trade figures showed a considerable improvement upon 1927. The imports of merchandise in 1928 were of a value of £186 millions, and there was an import of gold and silver of £25 millions; the exports amounted to £253 millions, leaving a visible balance of trade in favour of India of £42 millions, against £37½ millions in 1927. But though the trade conditions of India in general continued to be fairly prosperous, the year 1928 was in many respects a trying one for that country. It was marked by strikes in various industrial centres, and particularly in Bombay, where the disastrous strike in the cotton-mill industry extended over a period of six months and affected all other trades and industries throughout the city. For a considerable time the mills had incurred considerable losses, and as a result both owners and mill-hands were dissatisfied. The owners made endeavours to introduce more economical and improved methods of working, but this was resented by the mill-hands; and in April last the mills closed down owing to the mill-hands going on strike. In October, a truce was called pending the reference of the matters in dispute to a Strike Inquiry Committee appointed by the Government of Bombay, but little improvement was made in the work carried on in the mills, and renewed so-called "lightning strikes" became almost a daily occurrence. The result was a change in the attitude of labour from a more or less contented and passive state to that of a truculent and revolutionary character, and to all sorts of demands upon employers, reasonable and unreasonable, being put forward at the instance of Communistic and Socialistic agitators. Respect for law and order, which formerly had been a characteristic of the population, was undermined, and when workers of another religion were introduced to take the place of strikers, riots and bloodshed resulted. The disturbances in Bombay between Hindus and Mahommedans involved, according to official reports, some 150 deaths and nearly 800 more or less serious casualties. Order was eventually restored after placing the City under the control of the Military, and after the mobilization of the Territorial Army to assist the Regular Army in quelling the rioting.

The trade losses in Bombay have been enormous, and the progress and prosperity of the city has without doubt been retarded for some time to come.

The "Times of India" for Feb. 23 last reported that His Excellency the Governor of Bombay, in opening the Budget session of the Legislative Council on Feb. 18, summarized the financial outlook of the Presidency by saying that "the financial position which has been so unsatisfactory in recent years does not show any improvement; and while it is true that the general trade statistics of the port during the past year have begun to reflect a distinct move in the upward direction, there is reason to fear that the recent disturbances, and the generally unsettled state of the principal industry of Bombay, are likely to have an adverse effect which may not disappear for some time."

You will doubtless have seen from the Press that the Public Safety Bill recently introduced into the Legislative Assembly by the Government of India, which provided for the deportation of non-Indian Communists, was blocked by the action of the President, but has since been carried into effect by the strong hand of the Viceroy.

Public Lighting in Bombay.

As a consequence of the state of disorder in Bombay to which I have alluded, the utmost difficulty was experienced in maintaining the lighting and extinguishing of the public lamps, as the lamplighters refused to go into the disturbed areas without being escorted by the Company's Public Lighting Superintendent and his assistants. With very few exceptions, however, the lamps were maintained in lighting each night—a fact whch speaks volumes for the courage and devotion of Mr. Blackmore, the Company's Public Lighting Superintendent, and his Chief Lamp Inspector.

Our Company, of course, has not escaped the blighting effect which the riots and disorder have had upon all industries and undertakings in the city. The increase in sales to which our Manager, Mr. Lane, confidently looked forward have not been realized to the extent which he anticipated, but we may congratulate ourselves, and particularly Mr. Lane and his staff, that our Indian employees remained loyal and orderly, and that in spite of difficulties the Company's business continued to make progress.

Increased Sales.

The total quantity of gas sold during the year was 474,729,000 c.ft., being an increase of 22,000,000 c.ft., or 4·8 p.ct., over the previous year. Of this increase, however, about two-thirds is accounted for by an adjustment of the estimated consumption of gas by the public lamps. Allowing for this adjustment, and comparing the figures on the same basis as the previous year, there is a normal increase of 1·7 p.ct. in the sale of gas compared with an increase of 5·6 p.ct. in 1927. The increase in the quantity of gas sold for heating purposes was 15 million c.ft., or 7·2 p.ct.; but for private lighting there was a decrease of nearly 9 million c.ft., or 18·1 p.ct.

The net total expenditure for the year on capital account is £17,164. The erection of the new gasholder of a capacity of 1½ million c.ft., in respect of which there is a debit of £15,216 in this account, has been completed. It has been put into commission and is giving every satisfaction. Great credit is due to the designer, Mr. George Evetts, and to the Contractors, Messrs. Thomas Piggott & Co., Ltd., and to Mr. Lane and his assistants in Bombay.

An additional five miles of mains were laid during the year, involving a cost of £3850.

Important additions and improvements have been carried out on the works which have already made for better working, and will prove to be still more advantageous as time progresses. Additional washing plant has been erected and put into operation. Mr. Lane reports that this plant is considered a model for works situated in tropical countries, and is of very high efficiency. The re-setting of retort beds to suit the new conditions demanded by the introduction of machine charging and discharging has been going on steadily throughout the year.

Gas for Heating in the Tropics.

On the district, the expansion in the sale of gas for heating purposes has been fostered by the introduction of the hire and hire-purchase systems; 1330 additional appliances for cooking and heating having been issued to consumers during the year.

There is a credit on capital account of £484, being the sum repaid to the Company by the Municipal Corporation in respect of a disputed claim to rights of ownership over certain water courses traversing land purchased by the Company, and of £1994 depreciation of meters in stock and in use.

It will be observed from the report that a sum of £5654 has been written off for depreciation of meters, and charged in No. 4 Account. Owing to the changing character of the requirements of gas consumers in the Company's district of supply, the necessity for larger meters for combined uses of lighting and cooking, &c., the removal of meters from small premises which have been demolished for the purpose of the construction of new and improved thoroughfares in

Bombay, and the loss of a number of small consumers to electric lighting, and of others who have left Bombay owing to the disturbances, a considerable number of small 2-light and 3-light meters have been brought in from the district. In consequence of these changes, there appears to be only a remote possibility of further use for more than a few of such meters in the future. The value of these smaller meters as standing in the books of the Company has therefore been written off.

Turning to the revenue account, private gas rental is less by £1117, owing to the decrease in the sale of gas for lighting purposes, but gas rental for the public lamps is more by £1754, owing to the increase in the number of lamps supplied. The figures relating to public lighting have now been re-arranged for the first time; the net revenue being shown after deduction of the cost of maintenance. Correspondingly the item of "public lamps lighting and repairing," which appeared on the other side of the account, is not now included in the expenditure. The public lighting revenue of £33,391 represents the net revenue received for gas consumed by public lamps, and is £2038 more than the corresponding figure for 1927 would have been if the account had been presented in the same manner.

Decreased Revenue from Residual Products.

The revenue from the sale of residual products was less by £1505. The receipts from coke and breeze were less by £803; the average price for coke being 29s. 11·7d. per ton, against 32s. 1·8d. per ton in 1927. The receipts from the sale of tar are less by £702; the price per gallon being 6·5d. compared with 7·3d. in 1927.

On the other side of the revenue account, the total expenditure is less by £7785; but allowing for the re-arrangement now made in the items of coke for water gas plant (£2892) and public lamp charges (£6347), the actual total expenditure is £4330 less on a true comparison with the total expenditure of the previous year.

Coal, together with the cost of coke used in the water gas plant (£2892), cost £642 more; the quantity of coal carbonized being 395 tons more. The cost of coal carbonized was 31s. 11·3d.—a saving of 1s. 11·2d. compared with the previous year. The quantity of coal carbonized was 30,179 tons, and the sale of gas per ton of coal carbonized amounted to 13,654 c.ft. The net cost of coal, after deducting receipts from residuals, was 11·8d. per 1000 c.ft., against 10·9d. in 1927.

Carbonizing wages are more by £1069, mainly due to increased manufacture of water gas. Repair and maintenance of works is less by £4024, owing to less work on repair and renewal of retorts. Distribution charges are more by £1390, mains and services less by £1489, and repair and renewal of meters and stoves more by £2646. Rents, rates, and taxes are less by £1242, and management and general charges are about the same.

In view of the general depression in Bombay, it is surprising that the losses from bad debts are under £10—that is, no more than 1·7d. per hundred pounds of gross receipts.

Net Result of the Year's Work.

In the net result of the year's work, the balance of profit carried to the net revenue account is £20,888. There is a profit on Exchange of £5052, which is £450 more than in 1927, partly owing to increased remittances. The average rate of exchange of the rupee was 1s. 6·22d., against 1s. 5·95d. in 1927. Adding this Exchange profit, and deducting the debit balance of interest, £1518, and the sum of £5654 for depreciation of meters, there is a net profit of £18,768 for the year. The undivided profit brought forward from the previous year (£39,620) brings the total available profit up to £58,388. Deducting from this the interim dividend of £10,500 paid in November last, there remains £47,888, out of which a final dividend of 3½ p.ct. is recommended, making 7 p.ct. for the year, leaving £37,388 to be carried forward to the current year, which is £2232 less than was brought in. The dividend recommended is 1 p.ct. less for the year than that paid for the previous eleven years; but in view of the present unsettled condition of affairs in Bombay and the trade outlook, I am sure that all shareholders will recognize the reduction as the only sound policy. Many of the inhabitants have been, we may hope and believe only temporarily, driven away to places where living is cheaper and less hazardous, and nearly all who are left are forced to curtail their expenditure even on such a necessary and economical commodity as gas.

Mr. Lane reports that it will take time to recoup the heavy losses made by trading firms in the city during the past year. Such bodies as the Municipality, the Port Trust, the Bombay Improvement Trust, and the Government have had to exercise stringent curtailments in their development schemes; and spending power in every direction has been heavily reduced. Trade cannot succeed or prosper until there is a resumption of stable and peaceful conditions throughout the country; and pending this taking place, I am sure you will agree that it is wise to shorten sail until the storm is over. I have no doubt that in ordinary circumstances the Company ought to be able to pay a steady 8 p.ct. dividend without any difficulty; and I look upon the present reduction as a purely temporary expedient to meet a passing emergency.

You will be interested to hear that during the year the Directors arranged with the eminent Consulting Gas Engineer, Mr. George Evetts, to pay a visit to Bombay in order thoroughly to inspect the works and business of the Company, and to discuss with Mr. Lane the present conditions, future prospects, and the lines upon which development can most profitably and economically be carried out. Mr. Evetts also visited Calcutta for a like purpose regarding the Oriental Gas Company, and we shared with that Company the cost of his visit to India, which was not heavy in comparison with the value of his expert advice and assistance. I may say that Mr. Lane when in this country has frequently urged the importance of a visit by one of the expert members of the Board; and when this was found to be impossible, he was very pleased to have someone, with Mr. Evetts' knowledge and experience of gas undertakings all over the world, with whom to talk over the Company's affairs. Mr. Evefts stayed a fortnight in Bombay, and with Mr. Lane's able assistance made himself thoroughly acquainted with the local conditions, the works, and, indeed, everything connected with the welfare of the undertaking. As a result, on his return he furnished the Board with an exhaustive report which will be of inestimable value not only to the Directors at home, but also—and perhaps even more so—to the Managers abroad. The report is too lengthy for detailed reference at such a meeting as this, but I will mention one or two points from it. Mr. Evetts stated:

(1) Out of 8000 public lamps in Bombay, 7000 are lighted by gas.

(2) He had made a thorough inspection of the works. They were in excellent condition; the plant and machinery being kept in a high state of efficiency.

(3) No extensive expenditure should be necessary on plant or buildings for some five or six years.

(4) The technical control and results at the works were uniformly good.

(5) Generally, the business was good, and any reduction in the rate of development or lower financial yield was due entirely to circumstances over which the Company had no control. Everything which could be done was being done in Bombay to keep the business, obtain new consumers, and maintain the receipts. If the trade of the town became normal, a great increase in business could be looked for.

(6) The Company were fortunate in being in very good favour with the consumers, as well as the local authorities and other public utility undertakings. He had the opportunity of discussing the business and policy of the Company with Government and Municipal officials, electricity and tramway companies' men, as well as most of the largest consumers; and there was no doubt about the good feeling which existed.

(7) The Company had an efficient and enthusiastic staff.

Mr. Evetts further reported verbally, at an interview which we had with him after his return from India, that he considered we had an excellent staff who never spared themselves in seeking the prosperity of the Company. He specially alluded to the services of Mr. Lane, and expressed his complete satisfaction with the way in which he conducted the Company's affairs in Bombay, and the position which he occupied there.

I must pay tribute to the way in which the whole staff of the Company in London and in India have served your interests during the twelve months under review. In Mr. Dickson, our Secretary, you have an officer who conducts the business of the Company to the entire satisfaction of the Directors; and the same remark applies to the members of his staff. Dr. Lane, the Engineer and Manager in Bombay, has given the best years of his life to your service, having spent some 28 years in India. He is technically most efficient, he is looked up to and respected not only by his own staff, Indian and European, but also by the leading people in Bombay, and he has done much to increase the prestige of the Company there. I regret to say that we have recently received somewhat alarming news concerning his health; and though there is some improvement in it, his medical advisers insist on his returning to England for a prolonged furlough as soon as he is strong enough to undergo the voyage. We trust that a sojourn in England will restore his health and make it possible for him to resume the duties in India which he discharges so ably and so much to the advantage of the Company. In Mr. Boulter, the Assistant Engineer and Manager, we have a young officer of whom Mr. Lane speaks in very high terms; but he has not been in India yet for quite two years, and we had hoped that he might have had a longer experience there before it was time for Mr. Lane to come home on furlough. He has, however, our complete confidence; and we are sending out an assistant to him who has had experience of the conduct of a gas company in a tropical country, and who, we hope, will prove able to give him all the help and support which he may need.

As regards the future, I cannot venture to prophesy. I am sure, however, that your Company is in a sound and strong position financially, that the works and distribution plant are in a thoroughly efficient condition, and that if the state of lawlessness and disorder which has recently occurred be brought to an end, and the trade of the city recovers its normal prosperity, the undertaking has a prosperous and successful career before it.

I now beg to move:

> "That the report of the Directors and the statement of accounts for the year ended Dec. 31, 1928, now submitted, be, and the same are hereby, received and adopted."

The Deputy-Chairman (Mr. H. H. Macleod) formally seconded the resolution.

Mr. W. J. Liberty expressed his pleasure at the remarks made by the Chairman regarding the work of Mr. Blackmore, who had unfailingly carried out his duties in spite of the personal risk involved. He pointed out that Mr. Blackmore was a member of the Association of Public Lighting Engineers, and his colleagues would be delighted to note what the Chairman had said.

The resolution was then carried unanimously.

The Final Dividend.

Proposed by the Chairman, and seconded by Mr. Stanley H. Jones, M.Inst.C.E., it was agreed:

> "That a final dividend for the year ended Dec. 31, 1928, of 3½ p.ct. (*less* income-tax at the rate of 2s. in the pound) be now declared payable on and after May 1, 1929, making, with the interim dividend of 3½ p.ct., a dividend of 7 p.ct. for the year."

The Deputy-Chairman proposed the re-election as Directors of Mr. W. G. Bradshaw and Mr. Stanley H. Jones. It would, he said, be difficult to exaggerate the value of the services which these two gentlemen rendered to the Company.

Mr. A. M. Paddon, M.Inst.C.E., seconded the resolution, which was unanimously passed.

Mr. Spencer Gore Browne and Mr. Alfred Morland, F.C.A., were

re-appointed Auditors, on the proposition of Mr. BERTRAM ELLIS, seconded by Mr. H. F. HILLS.

The CHAIRMAN proposed a vote of thanks to the Secretary, the Engineer and Manager in Bombay, the staff, and employees generally, to all of whom, he remarked, they owed a great debt of gratitude. They had experienced a very trying time, and all had remained loyal to the service, in spite of agitators who had endeavoured to lead them astray, and in spite also of the real danger that had menaced them in going to and from their work.

The DEPUTY-CHAIRMAN seconded this, and it was cordially agreed to.

The proceedings terminated with a vote of thanks to the Chairman and Directors.

HONG KONG AND CHINA GAS COMPANY, LTD.

The Annual General Meeting of the shareholders was held at the Company's Offices, 148, Gresham House, Old Broad Street, E.C., on Monday, April 22—Mr. ROBERT H. GLEN, F.C.A. (Chairman), presiding.

The SECRETARY (Mr. A. C. Pullen) read the notice convening the meeting and the Auditors' report.

The CHAIRMAN: Gentlemen, copies of the report and statement of accounts having been sent to all the shareholders, I will ask you to take them as read,

I am very sorry to have to report the decease of Mr. Leonard Askew, who was appointed to the Board in 1924. Mr. Alex. A. Johnston has been elected to fill the vacancy; he is a Gas Engineer of so wide an experience that his presence on the Board will be most valuable to the Company.

I commenced my remarks at last meeting by stating that we might reasonably expect to benefit considerably from revival of trade in the Colony. It is therefore with regret that we now speak of higher sales of gas at Hong Kong amounting only to 3½ million c.ft., and this increase at Hong Kong is practically negatived by lesser sales at Kowloon. The Military took special quantities of gas from us in 1927 on the Mainland. I assure you that unceasing efforts are being made to increase the business and to secure a proper return on the moneys expended in recent years.

The number of street lamps lighted by gas at Dec. 31 was 2393—an increase of 41. We are constantly endeavouring to effect improvements in the public lighting, which, as I have before remarked, is of a high standard.

Reference to the accounts will show that additions to land, works, and plant account amounted to £2232 for the year. As a consequence of this small outlay of capital on works account, our financial position improved considerably. Instead of having loans from the Company's Bankers here and in Hong Kong, we show cash on deposit.

In the revenue account, coal carbonized is $246,873, as compared with $231,037—an increase of $15,836, due to a lesser quantity of carburetted water gas being made than in 1927. The cost of coal per ton was heavier, but the amount of gas sold per ton was considerably higher. I mentioned last year that we were trying Indian coal, and am sorry to say the results from same are not what we had hoped for; but we shall continue the strenuous efforts of many past years to effect economy in coal and to bring down our carbonizing costs.

The charge for carburetted water gas is less, as the proportion of same made was smaller. Water gas is expensive to manufacture, but we have not yet found a sufficient market for all the coke available for sale.

Purifying is down, as there was no shipment of oxide last year.

Working expenses are higher; chiefly on salaries account, as extra payments were made to officials during the manager's absence on leave, coupled with other causes of more expenditure. I stated before that discounts are included here, but we propose to deduct the same from gas rentals account in the future.

Retort maintenance was down considerably, but we have made a reserve of £1125 towards future expenditure, and such a reserve will, in future, be appropriated from profit each year.

Maintenance of works was also lessened.

Showroom account was about the same as before. I may mention we have recently been compelled to vacate the showroom in the central part of the town, but the fresh premises secured by us near to the ferry which crosses to Kowloon are, I think, in an even better position; and we now have the services of a special head attendant, who should prove very competent, and who speaks English, Chinese, and Portuguese.

Bonus to staff and workmen is higher on account of increased dollar profit. The Board have always hoped that this scheme and the provident fund would make for good feeling amongst our staff.

Gas rentals account, also meter and fittings rentals account, were much the same as last.

There is a small increase in the credit for residual products. The question of residuals continues to engage our constant attention.

Depreciation of the furniture owned by the Company at Hong Kong, and of motor cars, is shown separately for the first time.

I think further comment on the accounts is not necessary, but shall be pleased to answer any questions you may desire to put to me thereon. The balance of net revenue is £49,541 10s. 2d., and a dividend of 10 p.ct. per annum, free of income-tax, is recommended, *less* the interim dividend of 5 p.ct. paid in October, 1928.

Extraordinary general meetings of the Company were held in June last, when the new Articles of Association were duly approved by the members.

With these remarks, I have pleasure in moving that the report and accounts be received and adopted.

Mr. STRACHAN C. CLARKE seconded the resolution, which was unanimously carried.

The CHAIRMAN then moved the following resolution:

> That a dividend at the rate of 10 p.ct. per annum, free of income-tax, be declared for the year ended Dec. 31, 1928, *less* interim dividend paid Oct. 13, 1928, the warrants to be made payable on April 26, 1929."

which was seconded by Mr. ALEX. A. JOHNSTON and carried unanimously.

The re-election of Mr. STRACHAN C. CLARKE as a Director of the Company was proposed by the CHAIRMAN, seconded by Major HERIOT R. GLEN, and unanimously carried.

Mr. A. E. HAYES proposed the re-election of Messrs. Cash, Stone, & Co. as Auditors for the current year, at their usual fee of fifty guineas, which was seconded by Mr. STRACHAN C. CLARKE, and carried unanimously.

The CHAIRMAN proposed a vote of thanks to the Staff in London and Hong Kong, which was seconded by Mr. A. E. HAYES and unanimously carried.

BILSTON GAS COMPANY'S AREA OF SUPPLY.

Board of Trade Inquiry.

On Monday, April 15, Mr. JAMES F. RONCA, Gas Administrator to the Board of Trade, attended at the Bilston Council Chamber to inquire into an application by the Bilston Gas Light and Coke Company for a Special Order under section 10 of the Gas Regulation Act, to extend the limits within which the Company are authorized to supply gas by the inclusion of "so much of the Urban District of Coseley, in the County of Stafford, as such Urban District was constituted on June 30, 1928, as is not within the existing limits of supply of the Company."

An inquiry of a similar nature was held last year—see "JOURNAL" for June 13, 1928, p. 731—and it was stated at the commencement of the inquiry on Monday that settlements had been arrived at with the following authorities who opposed the Order: The Dudley Gas Light Company, the Bilston Urban District Council, and the Coseley District Council. The only opposition to be considered was that of the Sedgley Urban District Council, who asked the Board of Trade to make an Order that, should the Sedgley Urban District Council be extended within the next two years to take in a portion of the Coseley Urban District Council area, the Sedgley Gas Company should have a right to supply gas to any such new area.

Mr. T. T. BLYTH (Parliamentary Agent) referred to the previous inquiry, when, he said, a number of ancient maps were produced to prove certain boundaries. After negotiations with the Dudley Gas Light Company, the conclusion had been arrived at that the portion of land taken over by the Dudley Corporation under their annexation scheme could probably be better supplied by the Dudley Company than by the Bilston Company. The latter were asking the Board of Trade to grant them Coseley; and if Bilston Council should at any time purchase the undertaking, the Company desired that they should purchase the whole, with the proviso that the Coseley Council should be permitted to acquire so much of the undertaking as was in their district. Coseley were perfectly satisfied with the boundaries, and were not inclined to have a portion of their boundary taken away simply because the Sedgley Council desired to supply residents with gas—needs which could be well met by the Bilston Company. What Sedgley asked was for a proviso that no power should be given for the supply of gas in any portion of Coseley which might within two years be transferred to the Urban District of Sedgley.

Mr. *G. Evetts* (Consulting Engineer to the Bilston Company), in his evidence, spoke of the understandings which had been arrived at regarding boundaries, adding that it had been stated that the Sedgley Authority had purchased an estate inside Coseley. If that were so, there was no reason why the supply of gas by the Bilston Company should be taken away. The Company were larger than the Sedgley Company, and had consistently sold gas at a cheaper rate than the Sedgley Company.

Mr. *W. H. Adams* (Engineer, Manager, and Secretary of the Bilston Gas Company) stated that the Company had been responsible for the development of the gas supply in the Sedgley district, which had been considered as part of the area to be supplied by the Bilston Company. He mentioned that, owing to the petitions from the residents, mains had been laid by the Bilston Company to supply gas to Swan Village and Woodsetton, and to certain parts of Sedgley. Application had been made by the Sedgley Company in winter time for assistance from the Bilston Company. There was no difficulty in supplying any house. The Bilston Company could give better service than Sedgley could. If there came a demand for a large number of houses, Bilston would be able to provide a main of greater capacity. Upper Gornal was supplied at the request of the Coseley Council years ago. With regard to the whole district, the Bilston Company were able to supply. They had plenty of room for increasing their works.

Mr. *T. R. Knight* (Clerk to the Sedgley Urban District Council) maintained that there was no question of urgency in the matter. The question might be left until there was a re-arrangement of the districts. Sedgley would be able to meet all requirements.

Mr. *J. Brettle* (Manager of the Sedgley Gas Company), in his

evidence, agreed that the Bilston Gas Company had acted as a stand-by in case of emergency. The gas-works were a mile from the Railway, and the Sedgley Gas Company were not supplying gas as cheaply as the Bilston Company.

Mr. ARLIDGE (Clerk and Solicitor to the Bilston Urban District Council) said that Bilston were anxious to see that the arrangements with Coseley were preserved.

The inquiry was concluded, and the Inspector afterwards visited some of the various districts mentioned.

SMETHWICK GAS DEPARTMENT.

Some Facts and Figures.

Students of municipal affairs who have attended the course of lectures arranged by the Principal of the Municipal College, Smethwick (Dr. T. J. Murray) paid a visit of inspection to the Gas-Works on Wednesday, April 24. An address was given to the visitors by the Engineer and Manager, Mr. ERNEST HARDIKER, F.C.S.

The Smethwick Gas Department, said Mr. Hardiker, was a statutory authority; served Smethwick with heat, light, and power; and supplied 905 million c.ft. of gas per annum for domestic and industrial purposes by means of 72 miles of mains and 113 miles of service pipes to 17,553 consumers. The capacity of the works was 3¼ million c.ft. of coal gas and 1½ million c.ft. of water gas per day. The water gas was only used during the winter months for emergency purposes. The requirements of coal were in the neighbourhood of 50,000 tons per annum. The revenue derived from bye-products last year amounted to £44,000 and the cost of coal was £53,000. The yields of bye-products per ton of coal carbonized were: Coke and breeze, 13⅞ cwt.; tar, 14¾ galls.; and ammoniacal liquor, 31 galls.

There were three chief distributing mains of 24 in. diameter leaving the works to supply the various parts of the Borough. Mr. Hardiker mentioned the fact that the money expended on overhauling this part of the distributing plant had been effective in reducing the "unaccounted-for gas" since 1921 by over 50 p.ct. The number of domestic appliances in use was 19,057. There were over 1500 lamps in the Borough—a lamp for every seventy or eighty yards. All street lamps were now operated by means of a clockwork system.

Councillor SAM SMITH accorded the welcome to the visitors on behalf of the Gas Committee and the officials. He mentioned that the works had been modernized during the last few years at a cost of £245,000, of which the sum of £64,000 was met out of revenue. The major portion of the expenditure was incurred in the installation of the gasholder and tank, which was of 3½ million c.ft. capacity and cost £68,000. The saving in the cost of manufacture represented, in the aggregate, the substantial figure of £27,000 per annum. The capital expenditure on the undertaking was in 1882, £142,198, equal to 24s. 8d. per 1000 c.ft., and in 1928, £474,913, equal to 10s. 11d. per 1000 c.ft.,—a reduction of 13s. 9d. As an illustration of how increased production reduced working costs and overhead charges, the cost per 1000 c.ft. dropped from 12·74d. to 7·12d. during the same period. Councillor Smith said that he was able to foreshadow further developments which would undoubtedly effect economies and go further to provide that efficient service to the consumers which the Committee desired. A commencement was to be made on the new distribution premises in Crocketts Lane. All the distribution departments would be centralized there, including workshops for the repair of meters, cookers, &c. A site had been purchased in High Street for the erection of new showrooms, and every facility would be afforded to consumers in those premises for the inspection of gas appliances in their natural surroundings. Councillor Smith paid a warm tribute to the officials and workpeople.

METER TESTING IN MANCHESTER.

Official Report.

The Official Inspector of Gas Meters for the City of Manchester (Mr. Arthur Winterbottom) has submitted to the Lord Mayor and Magistrates of the City the report of the City Justices' Gas Meter Testing Department for the year ended March 31.

The number of meters tested during the year amounted to 71,810, showing a decrease of 11,405 meters, as compared with the record year of 1928. The fees charged amounted to £4098, the total receipts being £4142, while expenditure amounted to £3831, leaving a credit balance of £311. Of the meters tested 3515 were rejected, or 4·89 p.ct. Of the wet meters tested—viz., 3314—167, or 5·03 p.ct., were rejected; and of 68,496 dry meters tested, 3348, or 4·88 p.ct., were rejected. The number of prepayment meters tested during the year was 46,323, the remaining 25,487 being of the ordinary type.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The Gas Referees' reports of the official testings for the past quarter give the following average calorific values for the gas supplied by the Metropolitan Companies named.

Commercial Gas Company.—503·7 B.Th.U. (declared calorific value, 500 B.Th.U.).

Gas Light and Coke Company.—503·3 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—561·7 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—502·9 B.Th.U. (declared calorific value, 500 B.Th.U.).

Tottenham and District Gas Company.—500·9 B.Th.U (declared calorific value, 500 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—475·9 B.Th.U. (declared calorific value, 470 B.Th.U.).

GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDERS.

Coventry Corporation.

To extend the limits for the supply of gas; to empower the Corporation to purchase by agreement the undertaking of the Bedworth Gas and Coke Company, Ltd.; and to provide that until gas is supplied from the Corporation's works at Foleshill a price not exceeding the existing maximum price authorized by the Bedworth Gas Order of 5s. 3d. per 1000 c.ft. may be charged for gas in the added limits. Upon gas being supplied in the added limits from the Foleshill works, the statutory or other provisions affecting the charge which the Corporation may make in the added limits shall be modified by substituting for the maximum price per 1000 c.ft. a maximum price per therm of 1s. 4·4d.; and within such maximum the Corporation may charge a price in the added limits not exceeding 2·4d. per therm above the price charged within the city. The Order is also to enable the Corporation to borrow money.

Ipswich Gas Light Company.

To confirm the purchase by agreement by the Company of the undertaking of the Felixstowe Gas Light Company; to authorize the manufacture of gas at Felixstowe until such time as a supply is available from Ipswich; to extend the limits of supply; to prescribe differential prices of gas to be charged in the added parishes; and to increase the capital and loan powers of the Company, and the authorized amount of the special purposes fund.

TRADE NOTES.

Spiral-Guided Holder for Walsall.

At a meeting of the Walsall Town Council last week a recommendation of the Gas Committee was approved to accept the tender of Messrs. C. & W. Walker, Ltd., of Donnington, Salop, for the supply and erection at the Pleck Gas-Works of a spiral-guided gasholder, of a capacity of 2 million c.ft., for the sum of £18,426.

Alloy Welding Processes, Ltd.

Owing to the rapid expansion of the business of the Alloy Welding Processes, Ltd., they have found it necessary to acquire larger works and offices, in order to cope with the orders received from all parts of the world. Their address, therefore, on and after Monday, April 22, is Ferry Lane Works, Forest Road, Walthamstow, E. 17—telephone, Walthamstow 2366 (three lines).

Sheet Metal Work.

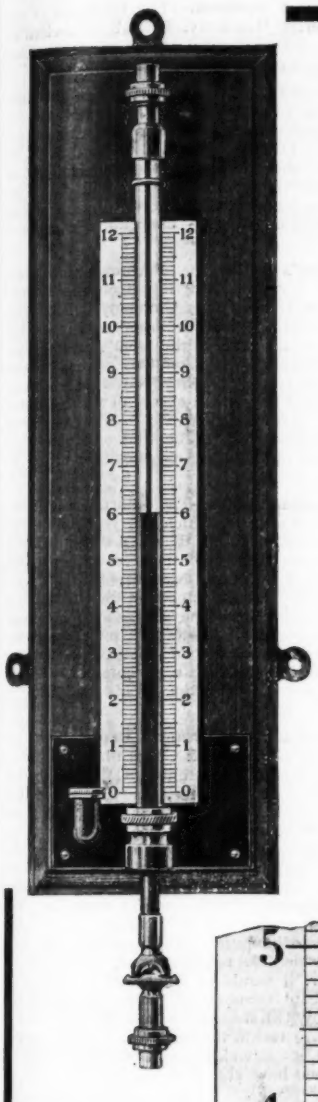
Messrs. Blagg & Johnson, Ltd., of Newark-on-Trent, have published a brochure dealing with their various sheet metal manufactures. Among the items mentioned are pressed steel gutters, rainwater and stove piping, sheet metal stampings, glazing bar, light steel structures, and galvanized trunking. The modern plant and facilities at the firm's works enable them to quote competitive prices with good deliveries.

The "Cadillac" Blower.

Metro-Vick Supplies, of Trafford Park, Manchester, have brought out a new design of blower, called the "Cadillac." This apparatus can be put to a great variety of uses, either in the form of a blower or as a suction device, and is of valuable service in keeping all types of machinery clean and free from dust. Special attachments are supplied for many kinds of vacuum cleaning and spraying work, the conversion of the apparatus from blower to suction being extremely simple.

Showing Cause of Error in Meters Rejected at Manchester.

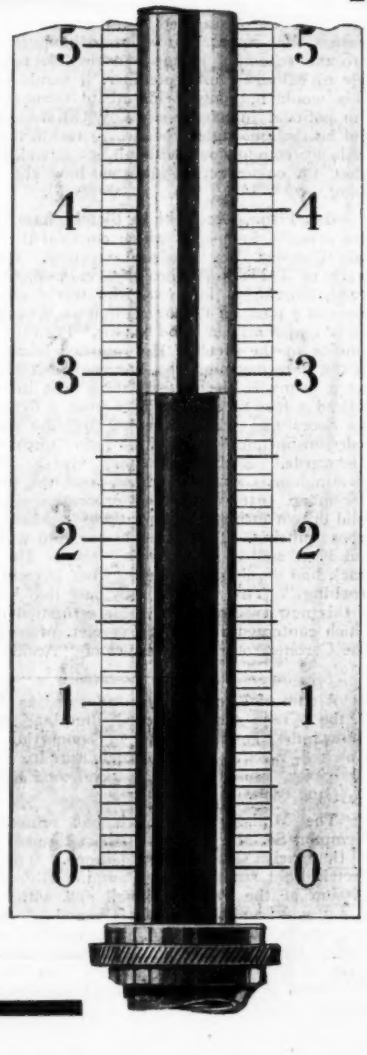
—	Leaking.		More than 2 P.Ct. Fast.	More than 3 P.Ct. Slow.	Passes Gas Without Registering.	Will Not Pass Gas.	Excessive Absorption of Pressure.	Other Faults.	Total.	P.Ct.
	External.	Internal.								
New wet meters . .	1	1	6	1	..	..	..	..	9	0·85
Old wet meters . .	39	10	70	6	5	3	5	20	158	6·98
New dry meters . .	28	74	131	170	5	11	8	21	448	1·26
Old dry meters . .	162	783	1034	589	86	43	72	131	2900	8·77
	230	868	1241	766	96	57	85	172	3515	..



WRIGHT'S WESTMINSTER SINGLE TUBE GAUGE

ALL-BRITISH.

Below—Full-Size Scale and Tube.



SINGLE GAUGES OR BATTERIES:

POLISHED WOOD OR IRON BACK.

ALEXANDER WRIGHT & CO., LTD. WESTMINSTER, S.W.1

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The tone of the market continues good, and prices are being well maintained. This is especially the case in Durham, where coking coals are still in strong demand, and gas makes are exceptionally busy for the time of year. News is to hand at the week-end that the Ruhr miners are dissatisfied with the recent wages award, and, while the position there is uncertain, strength is likely to be maintained in this market, and any trouble there would quickly be reflected on this side.

Wear Special gas coals are quoted at 16s. 6d. f.o.b., and best qualities at 15s. 9d. A prolonged stoppage at one of the collieries is considerably reducing the quantity of Wear Specials available. Other qualities are quoted at 15s. to 15s. 6d. Unscreened coking is firm for all positions at 15s. 9d. to 16s. Best bunker sorts ask 16s. to 16s. 6d., and seconds are 15s. 6d. Northumberland steams are inclined to ease, and best screened sorts are obtainable at 15s. to 15s. 3d.

Gas coke is quiet, and is quoted at 18s. 9d. to 19s. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

As a result of recent activities at the collieries, surplus stocks have accumulated, and this has encouraged buyers to hold off in the hope of further reduction in prices. Concessions are offered with the object of disposing of the production, but most collieries have arranged for a more restricted output in the hope of checking the downward tendency in values, which have fallen to 17s. 6d. or 17s. 9d. per ton f.o.b. Inquiry on forward account has been checked, though negotiations are fairly active in respect of requirements for the next few months. The export inquiry in industrial fuel has become quieter; but the home demand remains steady.

Supplies of gas coal and rough slacks are proving sufficient to meet the demand, though there is an active request for coke-making slacks. The demand for furnace coke remains firm, and the forward inquiries suggest further activity.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire.—Hards, Association, bunker 20s. 3d. to 20s. 6d., export 17s.; screened gas coal, export 17s. to 17s. 6d.; washed trebles, export 16s. 6d.; washed doubles, bunkers 19s., export 15s. 6d. to 16s.; washed singles, export 14s. 6d. to 15s.; washed smalls, bunkers 15s., export 12s.; rough slacks, bunkers 13s. 6d. to 13s. 9d., export 11s. to 11s. 6d.; smithy peas, export 17s. to 18s.

West Yorkshire.—Hartley's (f.o.b. Goole), bunkers 17s. 6d., export 16s.; screened gas coal, export 17s.; washed trebles, export 16s. 6d.; washed doubles, export 15s. to 15s. 6d.; washed singles, export 14s. 6d.; washed smalls, bunkers 14s. 9d., export 11s. to 11s. 6d.; unwashed trebles, export 16s. to 16s. 6d.; unwashed doubles, export 13s. to 13s. 9d.; rough slack, bunkers 13s. 6d., export 9s. to 9s. 6d.; coking smalls, export 9s. to 9s. 6d.

Derbyshire and Nottinghamshire.—Top hards, bunkers 20s. to 20s. 9d., export 16s. 6d. to 17s. 6d.; washed trebles, export 16s. to 16s. 6d.; washed doubles, export 14s. 9d. to 15s. 3d.; washed singles, export 14s. 3d. to 14s. 9d.; washed smalls, bunkers 14s. 9d. to 15s., export 11s. 6d.; unwashed doubles, export 14s. to 14s. 6d.; rough slack, bunkers 13s. 3d. to 13s. 9d., export 9s. 6d. to 10s. 3d.

Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, bunkers 17s. to 18s., export 15s. to 16s.; gas coke, export 19s. 6d. to 21s. 6d.; furnace coke, export 20s.; washed steams, Goole (West Yorks.), bunkers 18s.; Hull (West Yorks.), bunkers 18s. 6d.; Hull (South Yorks.), bunkers 18s. 9d. to 19s., export 16s.

MIDLANDS.

Collieries, whether inside or outside the Five Counties Scheme, are having to curtail output very firmly to keep stocks within bounds. It is stated that the difficulties of the season slackening of consumption have been greatly aggravated by false reports of impossible reductions in selling prices. Sales for the London market have been very small indeed, and the effect has been almost as marked in big provincial centres.

Notwithstanding the cancellations which followed the exaggeration of demand during the great frost, the swift subsidence of the market has left the distributive channels congested. Efforts are being made to prevent the forcing of spot lots on to an over-gorged market by drastic reductions of output. Many of the associated pits have been working far below the pressure permissible. Independent collieries which had been running without intermission for a very long time have had to apply the brake violently.

It is hardly possible to define the prices of common house coal in the disordered state of the market. Though the atmosphere is more equable in the industrial department, there have been reactions there. Collieries have had, and still have, large accumulations of slack to clear. With the market already glutted it is difficult to get any sort of offer. Buyers have been sought for ¾-in. slack at 3s. 6d. and 1¼-in. at 5s. 6d., these prices including wagon hire.

CONTRACTS OPEN.

Pipes.

The Clacton Urban District Council invite tenders for the supply of cast-iron pipes and specials. [See advert. on p. 293.]

The Walsall Gas Committee have agreed to contribute the sum of £6500 towards the relief of the rates of the Borough for the year 1929-30.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *April 29.*

The chief point of interest in connection with the past week is the continued inquiry for pitch, as a result of which the market tends to be still firmer. The present value is about 35s. per ton f.o.b.

Creosote is about 6¾d. f.o.b.

Tar spirits are unaltered at 1s. 11d. to 2s. for pure benzole, 2s. 1d. to 2s. 2d. for pure toluole, and about 1s. 7d. to 1s. 8d. per gallon for 95/160 solvent naphtha.

The price of pyridine bases remains about 4s. per gallon.

Tar Products in the Provinces.

April 29.

Markets for tar products still remain quiet, and business is difficult to negotiate.

The pitch position appears to have slightly improved. Very considerable quantities have been sold for prompt delivery, and the fall appears to have definitely stopped. The last business transacted was on the basis of 32s. 6d. f.o.b.; and manufacturers, having now got considerable relief, are not inclined to offer any further quantity at this figure. So far as forward delivery is concerned, a fair amount of business has been done for next season, and as inquiries are continuing, manufacturers are now asking higher prices.

Creosote is very quiet, and business difficult to negotiate.

Water-white products are firm; but there is not very much business doing. Crude carbolic acid is quiet. Cresylic acid is difficult of sale.

There is a fair amount of inquiry for crude naphthalene; but the prices are very low.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 22s. 6d. Pitch—East Coast, 32s. 6d. to 33s. 6d. f.o.b. West Coast, Manchester, 27s. 6d. to 28s.; Liverpool, 29s. 6d. to 30s. 6d.; Clyde, 29s. 6d. to 30s. 6d. Toluole, naked, North, 1s. 7½d. to 1s. 8½d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3¾d. to 1s. 4¼d. Heavy naphtha, North, 1s. to 1s. 0¼d. Creosote, in bulk, North, liquid or salty, 3½d. to 3¾d.; low gravity, 3d. to 3¼d. Carbolic acid, 3½d. to 3¾d. Heavy oils, in bulk, North, 6d. to 6¼d. Carbolic acid, 60 p.ct., 1s. 1od. to 1s. 10½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole	1 0 to	1 1	per gallon at works
Motor "	1 7 "	1 8	" " "
90 p.ct. "	1 9 "	1 10	" " "
Pure "	2 0 "	2 1	" " "

Walker's (Stourbridge) Fireclay has been registered as a public Company, with a nominal capital of £250,000 in 5s. shares. The objects are to acquire and work certain brick and fireclay properties in Staffordshire and Worcestershire, and certain mining properties in Worcestershire. The registered office is at 62, London Wall, E.C.

Horsham Share Issue.—As will be seen from an announcement in our advertisement pages this week, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of the Horsham Gas Company, 535 £10 "B" ordinary shares, ranking for a maximum dividend of 7 p.ct. per annum, equally with the existing "B" shares, which have, for the last five years, received this rate of dividend. The minimum price of issue is £10 per share.

Kingston-on-Thames Gas Company.—On Monday, April 22, about 250 of the Company's employees, all of whom were members of the Sports and Social Club, were present at a smoking concert in the Griffin Hotel, Kingston, by invitation of the Directors of the Company. Mr. H. W. Packham, the Managing Director, was in the chair. In the course of the evening the Chairman of the Company, Mr. Samuel Brown, offered a silver cup to be contested for annually between the cricket teams of Messrs. Hodgson's Brewery, the Kingston Electricity Department, and the Gas Company. A most enjoyable programme of entertainment was carried through; and Mr. R. Gray voiced the thanks of those present to the Directors for their hospitality.

Nottingham Gas Profits.—The profits on the Nottingham Corporation Gas Department for the year ended March 31 last amounted to £118,468. A further considerable allocation in relief of the district rates has again been rendered possible; the sum on this occasion being £29,790. The reserve fund at last year's statement of accounts totalled £209,453, there being a credit balance at that time of £170,330 on the renewals fund. During the past twelve months the receipts from all sources amounted to £648,856, and, after deducting expenditure of £530,387, there remained the gross profit of £118,468 as indicated. After allowing for interest on capital, and contributions to the sinking fund and depreciations, there remained a net profit of £40,862. This sum, with a balance of £37,997 brought forward from the previous year, left £78,859 available for appropriation, and, after providing for the amount in aid of the rates, the Committee has recommended that the sum of £10,000 be placed to the credit of the renewals fund, in consequence of the heavy demand which will be made upon it in the near future, and £39,069 be carried forward to the next account.

Whessoe Company's Increased Dividend.—The Directors of the Whessoe Foundry and Engineering Company, Ltd., have decided to pay a dividend of 17½ p.ct. for the year ended March 31, 1929. Last year the dividend was 12½ p.ct., and the year previous 10 p.ct.

Lancashire Tar Distillers was registered as a private Company on April 23 with a nominal capital of £300,100 (300,000 "A" and 100 "B" shares), to acquire the undertaking and certain of the costs of North-Western Co-operative Tar Distillers and C. Lord and Sarah A. Lord respectively, to take over that portion of the undertakings of Hardman and Holden, Thomas Horrocks & Sons, and J. E. C. Lord (Manchester), respectively, as relates to the distillation of tar, and certain of the assets belonging to such undertakings or parts thereof.

Wandsworth Gas Company's Bill.—The Parliamentary Committee of the London County Council, reporting upon the Wandsworth, Wimbledon, and Epsom District Gas Company's Bill, state that the "basic price" of 11·4d. per therm proposed in the Bill compared with 11d. per therm in the case of the other London Companies. As the result of negotiations, the Company agreed to substitute a basic price of 11d. a therm. Amendments were also agreed to provide that no dividend should be paid in excess of the basic rate when the price charged to the ordinary consumer in the Company's Wandsworth area exceeded the basic price, and that an opportunity should be given for the revision of the basic price within ten years from the passing of the Bill.

Continental Union Gas Company, Ltd.—The report of the Directors for the nine months ended March 31, which will be submitted at the annual meeting next Wednesday, states that the re-organization of the Company's capital and the change of name can be put into operation shortly. After deducting management expenses and current pension charges, the balance at the credit of profit and loss account at March 31 was £22,106; and the Directors recommend the payment at the full rate on the £200,000 7 p.ct. preference stock, or 5¼ p.ct. for the nine months, less income-tax. They also recommend the distribution of 2 p.ct., less income-tax, on the £800,000 ordinary stock for the nine months. This will leave a balance of £906 to be carried forward.

Messrs. Newton Chambers & Co., Ltd., Annual Report.—The annual meeting of Messrs. Newton Chambers & Co., Ltd., was held in Sheffield on April 24. The Directors recommended a distribution equivalent to 6 p.ct., free of tax, for the year. It was stated that the new carbonizing battery of Becker coke ovens at Thorncliffe Coal Distillation, Ltd., at Smithy Wood, was now well on the way to completion. Sir Samuel Roberts, Bart., M.P., a Director of the firm, said he was of the opinion that the Central Collieries Commercial Association, commonly known as the Five Counties Scheme, had done real good, and was capable of future useful extension; but the work was hampered by the minority of coalowners who, for reasons that appeared to him to be purely selfish, refused to come into the scheme. If any considerable number of firms should decide to withdraw in September, it would be impossible to carry on. This would not only bring about commercial chaos, but would invite political interference. Any Government would then be bound, and he thought rightly bound, to tackle the problem, and do for the trade by compulsion, with all its attendant evils and interferences, what the coalowners would then have shown themselves incapable of doing.

Gas Fitting Accident in Birmingham.—A defect in a gas fitting was revealed in a case which engaged the attention of the Birmingham Coroner (Dr. Davison) recently. The inquiry related to the death of Thomas Hughes (65), a haulage contractor, 2, Newlands Road, Stirchley. His son, who works at night, stated that he left home at 7 p.m. on Friday, March 22, leaving his father sitting downstairs apparently in good health. Prior to leaving, witness put two pennies in the meter. He returned home shortly after five o'clock on the Saturday morning, but could not light the gas. He therefore put a penny in the meter, which was in the hall, and immediately noticed a hiss of escaping gas from a fixture in the hall. He threw the doors and windows open, and the gas was turned off. In a bedroom upstairs he found his father unconscious, and he died shortly afterwards. Richard Gregory Marsh, Fittings Engineer to the Birmingham Gas Department, said the pendant had been up since December, 1926, when the Corporation replaced brazed fittings with solid drawn fittings, because there had been some cases of the brazed tubes splitting. The fitting in question was solid drawn tube, which had been subject to searching tests. He was of opinion that the crack had developed owing to what is technically known as "season cracking." This was the only case that had occurred out of 180,000 of this new type of fitting. He estimated that about 30 c.ft. of gas, which contained 16 p.ct. to 17 p.ct. of carbon dioxide, had escaped. The Coroner returned a verdict of "Accidental death."

A sum of £300 has been allocated as the Gas Committee's share of the £1200 cost of special illuminations to be arranged by the Morecambe Town Council in connection with the 1929 Autumn Carnival Week. Other contributors to the lighting cost are the Electricity, 'Buses (late tramways), and Entertainments Committees, all £300 each.

The Ministry of Health has refused the application of the Plympton St. Mary Rural District Council for street lighting powers in the parish of Compton Gifford. The District Council erected electric light standards in Compton Gifford without asking the permission of the Parish Council and without consulting the Council in any way; and the District Council is being requested to deal with the removal of these standards, which being unlighted constitute a danger for which the Parish Council disclaims all liability in the event of any claim being made. The Parish Council has accepted the tender of the Plymouth Gas Company for street lighting for the ensuing year.

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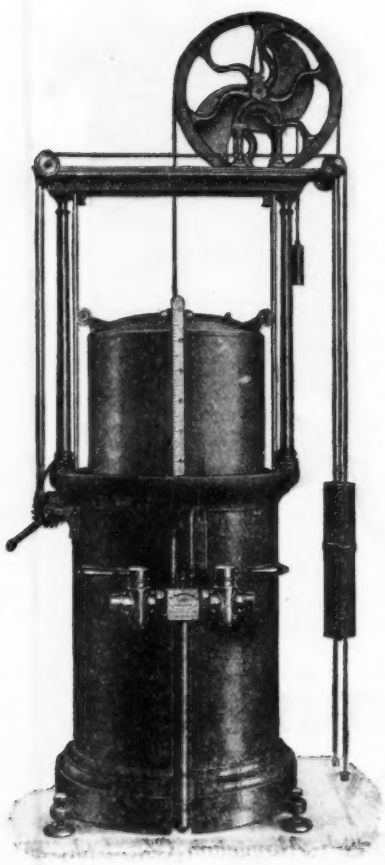

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